

NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES

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► SERVICE STRATEGIES

AT&T cuts SDN rates, offers dial-up access

Moves to parry rivals, broaden service appeal.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — AT&T last week cut rates for its Software-Defined Network service (SDN) by 6% to 8% and introduced a new access capability that allows users to link low-traffic sites to their SDNs using switched rather than leased lines.

The switched access capability makes SDN suited for low- and medium-volume traffic and should encourage current users to support more of their voice traffic with SDN. The new features and lower rates are also designed to make SDN more

competitive with the virtual private network services offered by MCI Communications Corp. and US Sprint Communications Co.

The SDN tariff changes, filed with the Federal Communications Commission, are scheduled to take effect Aug. 27. SDN is a switched network service that extends the functionality of private networks — such as abbreviated dialing and call management — to customer locations that do not otherwise have the traffic to justify leased lines to tie into dedicated networks.

SDN, used primarily for voice traffic, See page 40

► OVERHAUL AFTERMATH

US Sprint users back new guard

BY PAM POWERS
Senior Editor

KANSAS CITY, Mo. — Users and analysts last week praised US Sprint Communications Co.'s decision to replace Charles Skibo as president, saying the carrier will benefit from the cost control and operations expertise of new President Robert Snedaker.

In interviews with *Network World*, customers agreed that US Sprint's rapid growth has caused problems, including the billing woes that fueled a second-quarter write-down of \$350 million and led, at least in part, to the resignation two weeks ago of former President and Chief Executive Officer Skibo. But they said they are pleased

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► VSAT NETWORKS

Purolator changes net path

BY JOSH GONZE
Staff Writer

BASKING RIDGE, N.J. — Two years after implementing a sprawling leased-line network, Purolator Courier Corp. is scrapping it in favor of a Cylix Communications Corp.-supplied VSAT network, which is expected to cut the overnight delivery service company's communications costs by as much as \$60,000 a month.

When fully implemented, See page 41

SPECIAL SECTION: CENTREX

The central office phoenix rises

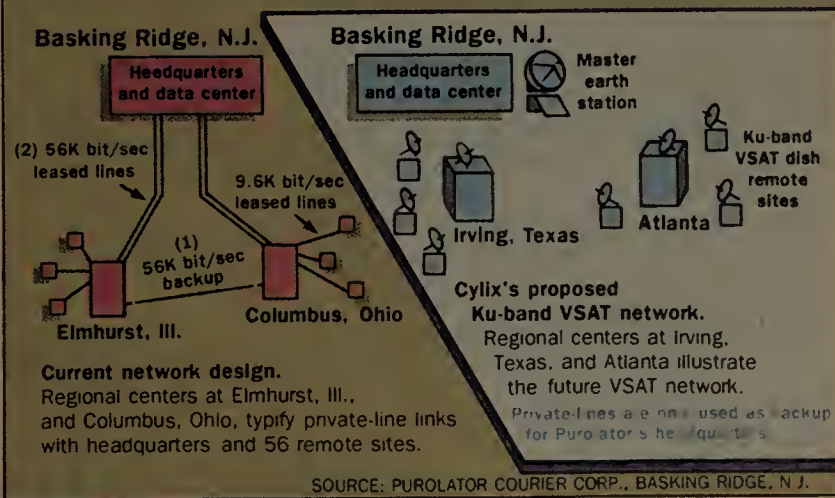
BY SUSAN G. SERRITELLA
Special to Network World

AT&T's Centrex was a major force in the telecommunications market during the late 1960s and early 1970s, when more than eight million access lines provided the service nationwide. However, in the late '70s and early '80s, the popularity of Centrex declined drastically and its days appeared to be numbered.

Many Centrex users abandoned the carrier-provided service and bought digital private branch exchanges that offered additional features, such as electronic station sets with single-button feature access, improved voice networking and data com-

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Cylix delivers Purolator's new VSAT network



NETWORK LINE

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► The first three users of AT&T's Centralized System Management weather early problems to reap voice-communications net control rewards. Page 2.

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hopes to improve ties to IBM SNA networks with the purchase of a minority interest in Netlink, Inc. Page 2.

► United Airlines joins with three European air carriers to build a European travel reservation network. Page 2.

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► UTILITY NETWORKS

Broadband users share pains, gains

BY PAULA MUSICH
Senior Editor

When Boston University's Michael Krugman began installing a campuswide broadband network five years ago, he found the cable design and installation contractors so inept that he was forced to take over and finish the job, working with his own staff members to fix problems caused by the installers.

Krugman, director of distributed computing and communications at the university, and other users acknowledge that broadband networks are difficult to install See page 8

► NCR COMTEN

NCR boosts 5620 FEP

Model has more ports, processing force.

BY PAUL KORZENIOWSKI
Senior Editor

ST. PAUL, Minn. — NCR Comten, Inc. is expected to unveil this week a new model of its 5620 front-end processor with twice the number of ports and two to four times the processing throughput of its previous low-end model.

The Comten 5620XP supports 64 communications lines using asynchronous, Binary Synchronous Communications, Synchronous Data Link Control or X.25 protocols. The Comten 5620 supported only 32 lines, unless customers installed a special option, Comten's

Integrated Protocol Converter, which increased the number to 64.

In addition, maintenance fees for the new model are 20% to 50% lower than for the previous model.

The 5620XP performs switching, routing, polling, error recovery and data concentration functions for small networks or remote sites.

The device can be attached to two IBM or NCR Comten mainframes and features up to 4M bytes of internal memory. The 5620XP's increased throughput stems from the use of a new CPU based on very large scale integration technology.

NCR Comten has two other front-end processors in its product line. The Comten 5660 is designed for large companies and supports up to 1,024 lines, and the Comten 3690 product line supports up to 512 lines and is designed for medium-sized and large companies.

Configuration

The Comten 5620XP functions either as a remote concentrator in a large network or as a front-end processor for a small network. According to analysts, devices such as the Comten 5620XP represent the fastest growing segment of the stagnant front-end processor market. This trend is expected to continue as companies place processors such as the Digital Equipment Corp. VAX systems at remote sites. NCR Comten first addressed this market segment in February 1985

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► JOINT DEVELOPMENT

Tandem buys into Netlink

BY MARY LINEHAN
Staff Writer

CUPERTINO, Calif. — Tandem Computers, Inc. last week purchased a minority interest in Netlink, Inc., a Raleigh, N.C.-based developer of concentration products for IBM Systems Network Architecture networks.

Under the terms of the agreement, Tandem and Netlink will jointly develop and market products designed to better integrate Tandem fault-tolerant Nonstop computers into IBM SNA networks.

Although details of the deal were not revealed, Tandem officials said it acquired less than 20% of Netlink.

"Netlink is a leading SNA connectivity supplier and, in keeping with the continued development of our SNA products, will complement our corporate goals and extend our product capabilities," said Gerald D. Held, Tandem vice-president of new ventures.

Netlink networking products include the SNA Hub, a microprocessor-based concentrator that resembles an IBM 3274 terminal con-

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► SYSTEM 85 CMS

Early problems aside, first users rate AT&T's PBX management system high

BY BOB WALLACE
Senior Editor

The first three users of AT&T's System 85 Centralized System Management (CSM) survived early product shortcomings and now say the system simplifies the supervision, control and management of their large voice communications networks.

CSM, which can also be used with the smaller AT&T System 75 private branch exchange and the vendor's older Dimension PBXs, is designed to provide users with network and PBX usage data that will enable them to optimize voice networks for cost. The system has its own data base, containing information regarding users, calling features and network configuration to facilitate switch management.

CSM consists of several applications, including Terminal Change Management and Facilities Management. Terminal Change Man-

agement, the most widely used feature, enables customers to administer telephone station moves, adds and changes by entering reconfiguration data in response to screen prompts. It also provides standard reports that enable users to analyze usage and network performance. Changes can be made in real time or programmed to occur at a later date.

Facilities Management enables customers to add or change PBX trunk lines, maintain an equipment inventory, test transmission facilities and implement net routing changes.

CSM resides on a single adjunct processor, typically a member of AT&T's 3B line of Unix-based computers, and is accessed using an AT&T 513 Business Computer terminal or any member of its asynchronous terminal product family. This processor is attached to the PBX via a single, high-speed communications link. But the networks

of the first users were so large that CSM had to be implemented on Digital Equipment Corp. VAX superminicomputers.

Telecommunications managers at Cornell University, Iowa State University of Science and Technol-

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► EUROPEAN NETWORKING

United Airlines joins reservation net venture

BY JIM BROWN
New Products Editor

BRUSSELS, Belgium — United Airlines, Inc. last week teamed with three European airlines in a venture to build a European travel reservation network that will supplant the air carrier's earlier ef-

forts to tie European travel agents into its existing Apollo reservation network.

United's Covia Corp. — which markets the Apollo system to U.S. travel agents — with British Airways, KLM Royal Dutch Airlines and Swissair, will invest a total of \$120 million to develop the European network. The announcement comes just three weeks after Air France, Scandinavian Airlines System, Lufthansa German Airlines and Iberia Air Lines of Spain announced a joint \$300 million venture to form the Amadeus reservation network. Covia's group plans to link together the independent IBM systems currently used by all three European air carriers by the first quarter of 1988, although software needed to make the net

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► LOCAL NETWORKING

Proteon net to support IBM PS/2

Firm also announces management software, cuts net costs.

BY PAULA MUSICH
Senior Editor

WESTBOROUGH, Mass. — Local network vendor Proteon, Inc. last week announced plans to support IBM's Personal System/2 microcomputers with its ProNET-10 token-ring network, and it cut prices for existing ProNET-10 networking products.

Proteon also announced plans to offer new network management software for ProNET-10 called TokenVIEW-10.

The new ProNET-10 network adapter cards will be compatible with the Micro Channel bus architecture used in Models 50, 60 and 80 of the new IBM Personal System/2 microcomputers. The Micro Channel bus supports up to 15 add-on devices, such as modems, graphics adapters and network interfaces. It also supports the faster data transfer offered in the new line of microcomputers.

Although Proteon did not announce a Micro Channel network interface for its ProNET-4 network family, which is interoperable with IBM's Token-Ring Network, Product Manager Bob Ryan said

the firm is "not precluding that."

The adapter and network management software represent a signal to ProNET-10 customers that Proteon intends to continue support for ProNET-10, a proprietary networking scheme, Ryan said. "We're trying to reinforce that ProNET-10 is a viable network for the future. It's important for our installed base of ProNET-10 customers to know we'll support the Micro Channel."

Although a price has not been set for the new adapter, which will be a nonintelligent interface, it will be available in November. The adapter will be compatible with Transmission Control Protocol/Internet Protocol as well as Novell, Inc.'s NetWare and Banyan Systems Inc.'s Virtual Network System network operating system software.

The TokenVIEW-10 network management software, which will be made available in three phases, will provide performance analysis, configuration management and network troubleshooting for network administrators. The software will run in a networked IBM Personal Computer or compatible des-

igned as the network manager.

The workstation does not have to be dedicated unless the customer requires constant availability of network management functions. The program will require a hard disk, and Proteon will recommend that it be run "in an IBM PC AT or AT-style machine," Ryan said.

Functions available in the first phase, scheduled for September, will include network configuration, data collection and statistical analysis. In the second phase, due to ship in December, Proteon will add automated fault-isolation capabilities. Phase 1 customers will be offered an upgrade to Phase 2 functions. In the third phase, due to ship in the first quarter of 1988, all network performance, configuration management and troubleshooting will be performed automatically by the software. No price has been set for the product.

Existing ProNET-10 adapters for IBM Personal Computers and Personal Computer ATs were reduced in price by 30%. The price for the p1300 adapter for the Personal Computer was reduced from \$799 to \$545, and the p1303 adapter for the Personal Computer AT

was reduced in price from \$899 to \$595. Proteon made the price cuts to remain competitive with Ethernet adapter prices.

In announcing the new products and price cuts, L.J. Sevin, acting president and chief executive officer, said the firm is attempting to put its widely reported troubles behind it. Sevin, one of the firm's principal investors, stepped in earlier this year after President Francis Scricco resigned ("Proteon president joins in executive exodus," NW, June 1). The resignation followed the departure of several high-level executives, a reportedly unprofitable fourth quarter and the return of products from distributors.

Although Sevin declined to discuss financial results, he acknowledged the firm experienced "flat earnings" in the fourth quarter, which ended Dec. 31.

The firm had sold products only through distributors until January, when it began to recruit value-added resellers to sell and install its networking products. With the new product announcement, Proteon will continue to court value-added resellers until it reaches a balance between value-added reseller, distributor and OEM channels.

Proteon is actively recruiting a new management team to replace the sales and marketing executives who left the firm. □

Washington Update

WASHINGTON, D.C. — Communications Satellite Corp. has proposed a four-year plan to refund \$62 million to its customers for alleged overcharges occurring from 1983 to 1986.

COMSAT filed its refund plan with the Federal Communications Commission July 10 in compliance with an FCC order issued in May. The FCC Common Carrier Bureau charged that COMSAT earned more than its legally allowed 12.48% rate of return by overcharging customers such as AT&T, MCI Communications Corp. and Federal Express Corp. for satellite transmission services.

COMSAT has denied the charges and said it will challenge in court both the allegations and the Common Carrier's authority in the matter. "The Bureau recognized that COMSAT presented several legal arguments, which, if accepted, would substantially reduce any refund obligations," the COMSAT filing stated. "Nevertheless, in an effort to expedite the resolution of this proceeding by considering the refund plan simultaneously with the legal review of the case, the Bureau ordered COMSAT to promptly propose a refund plan."

COMSAT proposed, in accordance with FCC policy, that the refund to carriers be passed on to end users. COMSAT proposed placing the refund money in an escrow account until the carriers decide how to distribute the funds to customers. COMSAT wants to pay the

refund to current customers rather than to those that paid the overcharges in the 1983 to 1986 time period.

■ The Telecommunications Subcommittee of the U.S. House of Representatives heard opposing arguments from two noted economists last week on the pros and cons of lifting the Modified Final Judgment restrictions on the regional Bell holding companies.

Alfred Kahn, an economics professor at Cornell University, and Lee Selwyn, president of Economics & Technology, Inc. in Boston, participated in the first of a series of hearings scheduled to examine the possibility of creating "a new, comprehensive telecommunications policy," said Subcommittee Chairman Edward Markey (D-Mass.).

Kahn, one of the key architects of airline deregulation, argued in favor of freeing AT&T and the RBHCs from regulatory restrictions. Selwyn said continued monopolies in the telecommunications industry prevent true competition and, therefore, current regulatory restrictions should not be lifted.

Markey said the subcommittee does not want to "micromanage the telecommunications industry" or influence current regulatory deliberations. He said Congress's intent is to ensure fair competition for large and small companies in the industry and to ensure diversity of choice for consumers. □

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► **SECOND QUARTER FINANCIALS****AT&T revenue up 42%****BY PAM POWERS**

Senior Editor

NEW YORK — AT&T last week reported increased second quarter earnings and revenue over the corresponding period last year, citing continuing cost-cutting measures and strong gains from long-distance revenue.

For the three months ended June 30, earnings rose 42% to \$596 million on \$8.4 billion in revenue, as compared with earnings of \$422 million on revenue of \$8.42 billion last year. The company noted that 1986 second quarter earnings were adversely affected by a 26-day strike.

In a New York meeting of securities analysts, AT&T Chairman of the Board James E. Olson attributed the improvement to earlier than expected benefits from the company's far-reaching cost-reduction program implemented last year and to its continued strength in the long-distance market, where revenue increased 5%.

Olson pledged his commitment to annual earnings improvement but cautioned, "We cannot guarantee that earnings for the rest of the year will match the level achieved in the first six months."

Olson said the company will press ahead with its cost-reduction efforts, which include improved manufacturing processes and inventory management and the lay-off program instituted last December. He said that program will be carried into 1988, but AT&T does not intend to lay off any additional employees.

AT&T noted that the 5% increase in long-distance revenue, to \$4.97 billion, was achieved despite the continuing decline in long-distance rates mandated by the Federal Communications Commission. Rate reductions were positively offset by growth in calling volumes and reductions in access costs, the company said.

Although Olson was cautious about future earnings potential, pending regulatory decisions may buoy future profit growth. "Without the rate-of-return regulation, AT&T's future profit potential is

enormous," commented Glenn Powers, a senior analyst with Northern Business Information in New York. "AT&T is still very much a long-distance company — that's where its fortune lies."

Long-distance earnings were depressed slightly by expenses associated with the development and implementation of a new billing

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► **LOCAL NETWORKS****Omninet gets NETBIOS***Unveiling leads Corvus product rollout.***BY PAULA MUSICH**

Senior Editor

SAN JOSE, Calif. — Corvus Systems, Inc. added IBM NETBIOS support to its Omnet personal computer network last week in the first of a series of connectivity announcements to be made over the next several months.

The Network Basic I/O System program, which is loaded from the network into each networked personal computer's memory and remains available in the background while other applications are running, operates with either of Corvus's network operating systems: PC/NOS or Constellation.

The NETBIOS support will allow Omnet users to run third-party applications written to NETBIOS, such as the multiuser data base management programs, PC/Focus from Information Builders, Inc. and the network version of the Crosstalk terminal-emulation program from Microstuf, Inc.

Other products in the series, dubbed the Corvus Connectivity Series, will provide connections between Omnet and industry standard local networks such as Ethernet and IEEE 802.5 token-ring networks. Corvus will also offer links between Omnet and mainframes, such as IBM's System/370, and between IBM and Apple Computer, Inc. personal computers.

The series will allow different network operating systems to co-exist on the same Omnet network, according to Corvus's director of product marketing, Monty Swiryn. For example, the company intends to make it possible for PC/NOS, Corvus's distributed network operating system, to coexist with Novell, Inc.'s NetWare.

Corvus, which has suffered a series of setbacks this year, including a layoff, the resignation of its president, James Siehl, and an expected unprofitable fourth quarter, is hoping the series will contribute to the company's growth. "By itself, it's not going to turn things around, but we're looking to products like this to improve revenues," said Corvus spokesman Gary Breeding.

Although the links to standard and other networking environments are necessary for growth, they may not help Corvus regain ground lost to other competitors, said Clare Fleig, director of systems research at International Technology Group in Los Altos, Calif. "Corvus has been losing ground over the last few years," Fleig said. "They continue to sell products, and I don't want to write them off, but I don't see them becoming a major player again."

The program costs \$69 and is licensed for an entire Omnet net, which can support 64 nodes. □

► **FINANCIAL NETWORKS****Unisys signs OEM deal with Doelz****BY JOSH GONZE**

Staff Writer

IRVINE, Calif. — In a move aimed at widening its networking offerings, Unisys Corp. has signed an OEM agreement with Doelz Networks, Inc. that gives Unisys the right to market Doelz's line of data communications products.

Under the terms of the agreement, Unisys' Financial Systems Division will market all Doelz products.

It will also provide customers with network design, installation and maintenance services.

Irvine, Calif.-based Doelz will further provide certain support services, such as software maintenance.

The agreement is the first such OEM arrangement for Doelz.

Officials of the company said it is expected to generate \$50 million in revenue during the next three years.

Analysts said the deal will strengthen Unisys' communications product line and both companies' standings in the financial systems market.

Unisys and Doelz have met with success in the banking and financial markets.

"We expect Unisys to be a good distribution arm for the company," according to James McNally, vice-president of marketing for the company.

"Unisys is well-entrenched in the financial marketplace, and that

is where we are doing well.

"This only enhances our efforts in that marketplace," he said.

Doelz's product line consists of a virtual-circuit switch called the Esprit One, a data concentrator called the Elite One and a net management system based on a Unix workstation that controls networks using the Doelz switches.

The Esprit is a packet switch that supports up to 1,400 virtual circuits and transmits data in a variety of protocols and formats without performing conversions. The Elite is an eight- to 16-port multipoint concentrator device designed to feed data to an Esprit switch.

Both products come in several models. □

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► **LOW BIT-RATE VOICE**

Micom mixes in voice

Mux supports voice/data on 56K link.

BY PAUL KORZENIOWSKI
Senior Editor

SIMI VALLEY, Calif. — Micom Systems, Inc. last week announced One Liner, a statistical multiplexer that can squeeze up to four voice transmissions and two data channels into a single 56K bit/sec digital link.

One Liner enables users to extend T-1-like integrated voice/data capabilities to remote offices that do not have the traffic to warrant installation of T-1 facilities.

Typically, when voice is transmitted as part of a multichannel digital link, it is encoded at 64K bit/sec using pulse code modulation (PCM) or, less often, 32K bit/sec using adaptive differential PCM.

One Liner encodes voice at 9.6K bit/sec or 14.4K bit/sec using Micom's proprietary Advanced Packetized Voice (APV) technology. The technique is based on adaptive predictive coding with adaptive bit allocation and adaptive time-domain harmonic scaling, algorithms that reduce the sample rate needed to digitize voice transmissions.

The multiplexer supports two voice cards, each supporting two voice channels. It can be programmed to digitize voice at 9.6K bit/sec or 14.4K bit/sec; the latter provides better voice quality but does not leave room enough to support any data channels.

The device also enables customers to squeeze additional voice channels from their T-1 lines.

For example, a 64K bit/sec channel that previously supported one voice connection would be able to support four conversations with One Liner.

A number of companies already offer products that digitize voice at low speeds, some as low as 2,400 bit/sec. But the voice quality of these products is not acceptable for all but special niche applications. Micom says the One Liner provides near toll-quality voice transmission.

Alexander W. Saunders, corporate vice-president of product operations for Micom, said a number of companies, such as AT&T, MCI Communications Corp. and US Sprint Communications Co. are working on techniques to increase the quality of low bit-rate voice transmission.

Analysts said One Liner marked something of a departure for the \$200 million Micom, which primarily sells data communications equipment to small and medium-sized companies.

Further, "Micom is not perceived as a technical leader," said Andy Schopick, vice-president at Gartner Group, Inc., a Stamford, Conn., consulting firm. The company will have to change that perception to make One Liner a successful product, he said.

Schopick said development of

One Liner may have been spurred by slowing growth in the company's primary markets, forcing the company to diversify to ensure future growth.

Last year, Micom purchased a

local networking company and recently reached an agreement to buy T-1 multiplexer manufacturer Spectrum Digital Corp. Those moves, coupled with the introduction of One Liner, indicate the company is trying to stake out the high ground in the communications market.

Robert Wilkes, an analyst at Brown Brothers Harriman & Co., gave the company passing grades for its efforts.

"The company is still in the transition period, and it has a strong balance sheet to weather any mistakes it may make," he said.

Saunders said three sites have beta tested One Liner. He said the company plans to offer additional products that incorporate its APV encoding technique.

The price for One Liner ranges from \$4,600 to \$10,000, and the product is currently available. ☐

► **INTELSAT SCAM**

Colino and two cronies plead guilty

BY MARY LINEHAN
Staff Writer

WASHINGTON, D.C. — The former director general of the International Telecommunications Satellite Organization and two associates pleaded guilty last week to fraud and conspiracy charges stemming from an elaborate kick-back scheme that bilked INTELSAT of nearly \$5 million.

Richard Colino, who appeared before U.S. District Court Judge Gerhard Gessell on Tuesday, pleaded guilty to one felony count of interstate transportation of money taken by fraud.

According to a statement from Colino's attorneys, the plea "fol-

lowed a substantial period of cooperation with the U.S. Attorney's office."

Washington, D.C. real estate broker Manuel Sera and Arkansas mortgage broker Charles Gerrell pleaded guilty to conspiracy to transport money taken by fraud. The three men waived their right to a jury trial under the plea agreement approved by Gessell.

According to the U.S. Attorney's office, Colino faces a maximum sentence of 10 years in prison and a \$250,000 fine, and Sera and Gerrell face maximum sentences of five years in prison and \$250,000 fines. Sentencing has been set for Sept. 11.

A spokesman for INTELSAT de-

clined to comment on Colino's guilty plea.

Documents that were released by the U.S. Attorney's office said that Colino masterminded four separate schemes in which he, Gerrell and Sera obtained approximately \$4.8 million of INTELSAT funds between the years 1984 and 1986.

Colino, who was named director general of the communications satellite consortium in 1983, was fired last December, after auditors identified an unauthorized \$1.35 million payment to a loan broker involved in the refinancing of INTELSAT's headquarters.

INTELSAT has filed a \$50 million civil suit against Colino. ☐

► **MODIFIED FINAL JUDGMENT**

RBHCs ask Greene not to ban R&D as AT&T seeks MFJ rule extension

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The regional Bell holding companies have asked U.S. District Court Judge Harold Greene not to accept AT&T's request that the Modified Final Judgment restriction on manufacturing include a ban on RBHC research and development activities.

The RBHCs expressed vehement opposition to AT&T's June 19 request in written comments filed July 10 with Greene. AT&T had asked Greene for a declaratory ruling on the meaning of manufacturing as outlined in the Modified Final Judgment. The RBHCs are currently barred from manufacturing telecommunications equipment and from marketing long-distance and information services under the 1982 Modified Final Judgment.

The RBHCs, many of which have in-house R&D operations and develop telecommunications software for their local exchange networks, refuted AT&T's claim that the Modified Final Judgment forbids the RBHCs from engaging in R&D that could lead to the "fabrication and internal use of telecommunications hardware and software," according to AT&T's filing.

AT&T also claimed that the Department of Justice, which is re-

sponsible for overseeing compliance with the Modified Final Judgment and investigating alleged violations, has been lax in enforcing the manufacturing ban, "unless the RBHCs were actually fabricating equipment or engaging in R&D that posed substantial competitive risks."

The Department of Justice has received a number of complaints on alleged RBHC violations relating to R&D activities. While the Justice Department is in the process of investigating them, AT&T said a clarification by Greene of the definition of the manufacturing restriction would clear up the confusion that led to the complaints against the RBHCs.

Pacific Telesis Group said AT&T's request would result in "an extension of the MFJ rules far beyond those agreed to in 1982. The MFJ does not preclude BOC innovation manifested through design or development of products to be manufactured by others, nor does it preclude production of software by a BOC for its own use." Pacific Telesis went on to say that AT&T did not cite any specific BOC manufacturing or R&D activities that should be curtailed.

Objections to AT&T's claim were raised by Bell Atlantic Corp. "The divestiture agreement entered into by the BOCs and AT&T and ap-

proved by the DOJ authorized the BOCs to develop telecommunications software as part of their exchange service business," the Bell Atlantic statement said.

A response filed by Southwestern Bell Corp. said AT&T's request is in direct conflict with the Modified Final Judgment, "which, on its face, distinguishes R&D from manufacturing." The agreement intended the RBHCs to engage in R&D, which is why engineering staff and certain patents were transferred from AT&T to the RBHCs at divestiture, Southwestern Bell noted.

Written comments from Nynex Corp. said AT&T has misinterpreted the Modified Final Judgment manufacturing prohibition. Manufacturing, company officials said, is separate from basic and applied research, engineering design, testing, standards development and production. AT&T wants to include all these areas within the manufacturing prohibition, which was not the intent of the Modified Final Judgment, Nynex said.

BellSouth Corp. said the motivation behind AT&T's petition is to "protect itself from competition in any activity related to telecommunications products."

The court has not set a date for its response to AT&T's request and the RBHCs' responses. ☐

ON JULY 7, 1987, NORTHERN TELECOM QUIETLY CHANGED FOREVER THE WAY TELEPHONE NETWORKS ARE DESIGNED AND BUILT.

We introduced DMS-SuperNode*.

Now local and long distance phone companies can provide their customers with unique features and functions they could never before offer, including ones they can develop themselves.

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DMS-SuperNode is the result of three important technological innovations:
DMS-Core, a high-performance computer that immediately doubles the processing power of DMS-100 systems, and by 1990 will increase it fivefold, to an almost incredible 1,500,000 call attempts an hour.

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A quiet commitment to the Intelligent Universe*, where sharing information anywhere, anytime, and in any form will be as easy as using the phone today.



NETWORKING

Broadband users' pains, gains

continued from page 1

and maintain. But they are willing to overlook those problems because they say broadband is the only networking technology available today that economically provides the flexibility, bandwidth and distance support they need.

Although broadband cable television systems have been around for 20 years, data networking is still a relatively new application of the technology. Broadband networks employ frequency-division multiplexing to divide coaxial cable into separate channels, each of which serves as an individual local network.

Information from video and computer equipment can travel only in one direction across the network, and a translator or head end is used to change the direction of a signal. The head end serves as a central point for the network, which is configured in a branching tree topology.

A single broadband cable plant can support multiple subnetworks, including terminal-to-host and host-to-host local networks, video networks for security or education applications, point-to-point links and interactive voice communications.

Broadband cable is more difficult to install because it requires the use of more cabling components than baseband networks. Broadband nets must also be custom designed and engineered. Cabling components must be serviced on an annual or semiannual basis, while baseband network components require less maintenance.

But a broadband network can be more cost-effective than a baseband net because a single cable can serve multiple network applications.

Broadband is considered an active networking technology, meaning electrical power must flow through the cable. That makes broadband nets susceptible to power outages. Baseband, in contrast, is passive. Also, because broadband uses analog signaling, digital data from computers connected to the network must be transformed into analog signals by a radio-frequency modem attached to the computer.

"No one understands both the analog and digital world," said Krugman, who went through three different contractors when trying to install a broadband cable plant to support video and data networks, including an Ungermann-Bass, Inc. broadband Ethernet network.

The Boston University network currently supports a 2,000-port terminal-to-host network, a host-to-host network, point-to-point connections and video applications.

While video or cable television broadband networks require less precision in cable plant design, broadband data networks require precise measurement of cable runs and placement of amplifiers, active components that boost signal lev-

els in the network, so that the network is balanced. Because television signals are less sensitive to attenuation or signal loss, amplifiers can be spaced further apart in cable runs.

But in a data net, amplifiers must be placed more closely together on the cable.

"In CATV land, you want to build a system with as few active components as possible," said Lynn Goodhue, director of communications systems for Smith College in Northampton, Mass. "We worked with a company that was good at installing cable TV. When they didn't understand the specs for the data network, they just went back to what they relied on for TV, not realizing just how sensitive the CSMA/CD protocol is to signal levels on broadband." Goodhue installed an Ungermann-Bass broadband Ethernet network for the college.

The Smith College network currently uses only one channel to support an asynchronous terminal-to-host network, although Goodhue said that video applications will be supported in the future. The network supports 800 ports, connecting terminals to four different hosts.

Goodhue said unbalanced networks and defective modems can create problems that are often difficult to detect. "When two network interface units are broadcasting at the same time and one is louder than the other, another NIU will see a garbled packet but not recognize it as a collision," Goodhue said. "It may be detected as a [cyclic redundancy check] error or may not be detected at all. One essentially out-shouts the other."

Other design and installation flaws can affect the performance of broadband data networks, whether the network employs the CSMA/CD access scheme or token passing. Noise, or radio frequency interference, can be introduced through an unterminated tap, which can act like an antenna and pick up signals out of the air, according to Goodhue.

Once faults are designed or installed into the network, they are frequently difficult to isolate, and the more faults that exist, the harder they are to find. "If you have a combination of open connectors, a little signal ingress and badly installed amplifiers, that will wreak havoc throughout the entire system," Krugman said. "A problem that appears at one point appears everywhere; it's pervasive. That makes it enormously difficult to track problems down."

"If you've got three or four such problems, the complexity increases geometrically, because all of these things interfere with each other, and it's no longer clear where or what the problem is," he said.

"There's no way to remotely isolate a failure," said Greg Moore, a staff systems programmer at the Bendix Aerospace Division of Allied Signal Corp. in Kansas City, Mo. "You have to visually inspect each connector or even take them apart to isolate problems." The Bendix network, a 3M Corp. (since

bought out by Allen-Bradley Co.) point-to-point broadband network, is supporting terminal-to-host links.

While faults are difficult to isolate, they are not difficult to detect. In a data network, response time degrades, and users will find that screens will fill more slowly with data, according to Goodhue.

Krugman found that while data channels on the Boston University network were "clean, the video applications were a mess," he said. Video channels would produce a lot of snow on the screen and slow-

ly escalating lines would move across the screen, he said.

Some faults in a broadband network can be isolated during regular maintenance of the cable plant. "The cable plant has to be tuned once a year. Amplifiers and taps must be checked," Goodhue said. Modems sometimes "drift out of spec, and the further they drift, the more problems they cause in the network," she said.

Such maintenance is not an involved process, "unless you don't know what you're doing," Krugman said. □

United Airlines joins net venture

continued from page 2

fully operational will not be ready until early 1989. The Amadeus group plans to be on-line in mid-1989, after swapping out the Unisys Corp. equipment its members currently use for IBM hardware.

A Covia spokesman said IBM's Personal System/2 may play a role in the unnamed network. The Personal System/2 is part of Covia's FocalPoint system, which enables U.S. travel agents to use the Apollo workstation to make flight, hotel and car rental reservations as well as perform office accounting and information management tasks.

The announcement comes during a time when Allegis Corp., parent of Covia and United, is the target of takeover efforts. Allegis officials have publicly said they would consider selling up to 50% of the Apollo network. Revenue from such a sale could be used to stave off those takeover attempts, analysts said. But Covia officials say the new joint venture will not be considered part of such a sale.

Both Covia's group and the Amadeus group announced plans nine months after a \$500,000 study commissioned by the 21-member Association of European Airlines (AEA) recommended that AEA members merge their 10 separate reservation systems into one

network that would block both American Airlines, Inc.'s Sabre and Covia's Apollo networks from gaining a firm foothold in the European market.

"The AEA has been pregnant for nine months. We now have to recognize that we have given birth to twins, something we really didn't plan for," said Karl-Heinz Neumeister, AEA secretary-general. "But the pregnancy was successful. We will have two strong systems in Europe, instead of most carriers concentrating efforts on their own national markets."

AEA had considered plans either to form a single European network or deploy the technology behind Texas Air Corp.'s System 1 or Trans World Airline's (TWA) Programmed Airline Reservation System (PARS). "The step from 10 systems to two is sufficient to cope with the U.S. invasion here. I don't think Europe is as vulnerable as it was nine months ago," Neumeister said.

A Covia spokesman said Apollo will cease marketing its system in Europe, while an American Airlines spokesman said the company will seek to add to the stable of 200 European locations already using Sabre. In addition, American is pitching against Texas Air's System 1 and TWA's PARS to provide software to Amadeus. The Amadeus group is expected to make a decision by July 21. □

Tandem buys into Netlink

continued from page 2

troller but supports up to 256 sessions. Netlink products have been used in IBM SNA networks since 1982.

"In general, it is a good investment because development of SNA products is a market requirement for Tandem," according to Lee Doyle, a consultant at International Data Corp., a Framingham, Mass.-based market research firm. "Although [Tandem] has made strides in that area, all minicomputer vendors will have to put expanded resources into SNA to gain results."

Company officials at Netlink, which is funded by venture capital, said they are pleased with the Tandem investment. "From our point of view, it shows that the products we have developed to date have a long-term life and [the investment] certainly adds to our

credibility," Netlink Chief Executive Officer Paul Wood said.

"[Tandem] sees the relationship as an opportunity to enhance integration between Tandem and IBM systems," Wood continued. "We have the communications process products, while they have [on-line transaction processing]. They have had a commitment to their SNA product line for a number of years now, but the relationship with us furthers that integration with IBM."

Held said Tandem instituted a new ventures program two years ago and has since made numerous investments.

"Our investments over the last 18 months have not been diversification or venture capital investments, but investments aligned with product, industry and geographic strategies," Held said.

Held said Tandem and Netlink are working on specific joint developments but would not disclose any of the details. □

INDUSTRY UPDATE

“For carriers, one major effect of deregulation has been an increase in the rate at which new technology is adopted. In a monopoly position, they could dictate to customers the rate at which new services were introduced. Now they are forced to move more quickly to maintain their competitive position. US Sprint [Communications Co.]’s all-fiber network has set new standards of quality for AT&T to match, while in the UK, both British Telecommunications [plc] and Mercury are planning Centrex services for business customers.

From Telecommunications: The Opportunities of Competition

Ovum, Inc.
Princeton, N.J.

► CONVERGENT TECHNOLOGIES

CTI strives for diversity

New products, distributors aimed at regaining lost ground.

BY MARY PETROSKY
West Coast Correspondent

SAN JOSE, Calif. — Following its recipe of mixing multiuser and local networking technology, Convergent Technologies, Inc. last week introduced a server that runs Unix and MS-DOS and supports both terminals and personal computers.

The product introduction is part of the company’s strategy of diversifying its departmental systems offerings and expanding its distribution channels, according to Michael Seto, product marketing manager for the Network Systems

Division.

Convergent has been active in the work group computing market since its founding in 1979. Initially, the company sold its workstations, servers and CTOS proprietary operating system to computer vendors such as AT&T, Unisys Corp. and NCR Corp. But in the last few years, the company has introduced products based on Unix and MS-DOS and expanded its distribution channels to include value-added resellers focused on vertical industries.

A key challenge Convergent now faces is to develop a coherent networking strategy across its

three product lines, Seto said. These lines include the NGEN workstations, which run CTOS and are available with an Intel Corp. 80186, 80286 or 80386 microprocessor, a family of Unix servers based on the Motorola, Inc. 68020 chip and the newly introduced Server PC, based on the Intel 80386 processor.

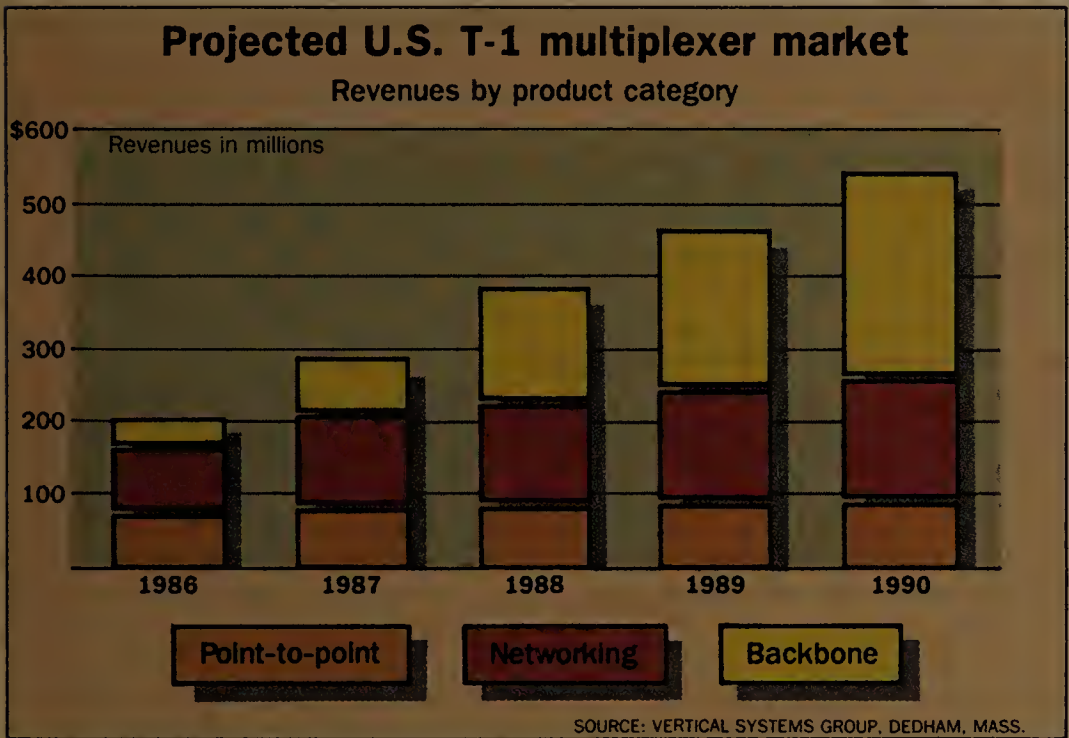
A second challenge is to regain profitability following the loss of AT&T as a customer. AT&T’s decision to bail out of the Unix workstation market meant the loss of a \$160 million-a-year account for Convergent, according to Bill Bennett, Convergent’s director of cor-

porate communications. As a result, the company’s revenue plummeted from \$459 million in 1985 to \$306 million last year.

Convergent posted a loss for 1986 and laid off 500 people last August. The company also showed a loss for the first quarter of fiscal 1987, which ended March 31. However, Bennett said, Convergent “expects to be profitable in the second half of the year.”

The company “is certainly working through a set of transitions,” acknowledged Bruce Morgan, vice-president of corporate marketing. “It’s been very important to broaden the customer base. You can’t run your business where you can lose half your revenue when you lose one customer,” Morgan said, alluding to the AT&T deal. “We’ve had to rebuild a major segment of our business.”

Convergent’s strategy to expand
See page 10



BRIEFS

Pacific Telesis Group announced the early retirement of its chairman and chief executive officer, Donald E. Guinn. Effective Sept. 1, Sam Ginn, now vice-chairman of the company, will assume the post of president and chief operating officer.

Digital Communications Associates, Inc. posted a 91% increase in income for its fiscal year 1987, to \$28.4 million, from \$14.9 million in the year ended June 30, 1986. Revenue grew 20% to \$181.4 million from \$150.7 million last year.

Infotron Systems Corp. said it is seeking a president and chief executive officer to replace its founder, James C. Hahn, who wishes to concentrate on the com-

pany’s strategic direction in the position of vice-chairman.

Infotron also announced two new contracts. The company will supply 990 Network Processors and Supermux 600 multiplexers to be used in a regional network for the U.S. Olympics Festival ’87, July 13-26 in Research Triangle Park, N.C.

Also, **General Telephone Company of the South** signed a \$92,000 contract with Infotron to purchase NX4600 Network Exchange T-1 multiplexers for its backbone voice/data net among cities in its eight-state region.

Harris Corp. announced the realignment of its Broadcast Microwave Operation from the compa-

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INDUSTRY EYE WILLIAM GEERY

SNA users can reap the benefits of X.25

The X.25 protocol for packet switching offers many benefits that IBM Systems Network Architecture users can take advantage of by integrating X.25 into portions of their networks where it makes sense and provides the most value.

X.25 networks are optimized to move packets of data and are not specific to an individual host or terminal protocol. Any packetized data — asynchronous, Binary Synchronous Communications or SNA traffic — can be transported through the X.25 network, which may be used as an alternative to leased and switched lines.

The X.25 architecture is vendor-independent. The only requirement for compatibility is that the network interface, such as the packet assembler/disassembler, comply with the X.25 standard.

As a result, X.25 users can access any device on the network with a compatible PAD, providing expanded connectivity to devices formerly locked into a single destination via point-to-point circuits.

Geery is systems technical support manager for private network systems at NCR Com-
ten, Inc. in St Paul, Minn.

In addition, because the internode trunks within an X.25 network multiplex the data from many devices, fewer leased lines may be needed and higher speed lines can be justified.

For network management requirements, X.25 provides detailed network usage statistics for use in accounting, billing and capacity planning. In many instances, SNA networks don’t provide such detailed network usage information.

Because an X.25 network, by design and operation, separates the host from the terminal side of the network, it simplifies network reconfigurations, which can be done on-line and do not require changes to the entire network.

As a result, major reconfiguration efforts can be broken down into parts and handled through a gradual, phased approach.

Integrating X.25 into an existing SNA network lets users take advantage of the benefits of X.25 while continuing to use the SNA architecture when and where appropriate. Users can implement X.25 through a public X.25 network or a user-owned private X.25 network.

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CTI strives for diversity

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its distribution channels and reduce its reliance on a few large OEMs is "a very sound one," according to Gwendolyn Peterson, vice-president and director of Computer Products Service for Dataquest, Inc., San Jose, Calif. "They're doing an aggressive job of coming out with products that seem to meet the market need," Peterson said, adding that Convergent has built a reputation as a supplier of innovative technology.

Although Convergent's focus on so-called distributed networking was its hallmark several years ago, the current market demand for this type of networking has forced a repositioning of Convergent, Peterson said. In distributed processing, both workstations and servers perform applications processing. The company originally competed against supermicrocomputer vendors, such as Altos Computer Systems, that essentially offer time-sharing systems. Now, Peterson said, "We'll find Convergent competing more and more with local-area network vendors such as 3Com [Corp.] and Novell [Inc.]."

Convergent's biggest problem may be differentiating itself from other networking players, Peterson said. "While at one time they had a unique approach, the bad news is they now have a lot more competition," she noted.

Like many other computer vendors, Convergent is looking to standards as the glue to tie its own systems together, as well as to link them to other vendors' systems, Seto said. In the short term, the company will promote the Department of Defense Transmission Control Protocol/Internet Protocol as the common thread across environments. In the long term, Convergent will migrate toward standards based on the Open Systems Interconnect model, Seto said.

Moving toward standards has been an important part of Convergent's product evolution. The company's first workstation line, introduced in the fall of 1980, was based on CTOS, a proprietary multitasking, distributed operating system. CTOS has built-in networking functions that allow for file, printer and communications sharing. Communications are based on master-slave polling protocols.

The company maintained CTOS as the native operating system for its second generation workstations, the NGEN line, introduced in

1983. These workstations can be networked with NGEN Cluster, a 1.84M bit/sec network that uses either RS-422 type cable or twisted-pair telephone wiring, according to Joanie Banks-Hunt, communications products manager for the Cluster Systems Division.

Last summer, Convergent introduced a coprocessor that allows NGEN workstations to run MS-DOS applications. Another product, ClusterShare, allows an NGEN to act as a file and mail server for a combination of NGEN workstations and IBM Personal Computer-compatible personal computers. Last fall, the company introduced its own IBM Personal Computer AT-compatible personal computer.

While embracing CTOS on its workstations, Convergent in 1983 branched off into the Unix market with a series of computers that have evolved into its S-Series servers. Based on the 68020, the current six S-Series models support from five to 128 users.

Convergent's implementation of Unix, called CTIX, is based on AT&T's Unix System V Release 3.0 and supports AT&T's Remote File Sharing as well as Streams. Streams defines the interface to protocol modules, allowing for independence between applications and the underlying communications protocols, Seto said.

Early this year, Convergent introduced PC Exchange/VINES, software based on Banyan Systems, Inc.'s Virtual Networking System. PC Exchange/VINES allows the S-Series computers to act as file, print and mail servers for MS-DOS-based personal computers.

Convergent enhanced the Banyan networking software, "opening it up" so that Unix applications can also run on the servers, Seto said. These servers also support a range of communications protocols implemented by Convergent.

The new Server PC also uses PC Exchange/VINES and is aimed at meeting the needs of personal computer network users. This server, based on a 20-MHz Intel 80386 microprocessor, runs CTIX as well as MS-DOS by using software called Merge 386 from Locus Computing Corp. of Santa Monica, Calif. The Server PC allows users to run both Unix and MS-DOS applications on the server, said Henry Robinson, Server PC marketing manager.

The Server PC currently supports both RS-232 and Ethernet connections. Support for IBM's To-

ken-Ring Network as well as for RS-422 connections will be provided later this year, Robinson said. The server's base configuration includes 4M bytes of memory, an 80M-byte disk drive and a Personal Computer AT-compatible floppy. Pricing to OEMs and value-added resellers is \$7,500, with shipments to begin in the third quarter.

Network-oriented from the start, Convergent officials believe communications capabilities are the key to the company's growth. "Convergent sees its competitive advantage in providing open architected networks, PC serving and a family of workstations," as well as connections into the IBM world, Seto said. "Convergent is dedicated to connectivity — we started out with distributed networking on our workstations, and we want to continue that," Seto added.

Hand-in-hand with product diversification, Convergent is diversifying its channels of distribution. From its early dependence solely on OEMs, Convergent is aiming to balance its distribution between OEMs and value-added resellers, Bennett said. The company's value-added reseller program, approximately 1 year old, now generates about \$100 million in sales, Bennett said.

A separate subsidiary called Convergent Business Systems, Inc. has acquired a number of turnkey resellers since the fall of 1985 and has built itself up to a \$200 million business, Bennett said. Because Convergent Business Systems is oriented toward niche marketing to independent businesses, Convergent has avoided conflict with its OEMs, which sell primarily to Fortune 500 companies, Morgan said.

Another part of the company's formula for success is to leverage its ability to run faster and jump higher technologically than other suppliers. "We have been a technology supplier, not a commodity supplier," Morgan said. "We have a track record of continued product innovation and have the ability to bring exciting technology to market in a reasonably short period of time," he added.

Dataquest's Peterson said she is "hopeful" that Convergent will pull out of its financial slump and gave a vote of confidence to the company's management team. Both Chairman Paul Ely and President Cyril Yansouni are veterans of Hewlett-Packard Co., Peterson noted. However, although Convergent is "doing a lot of the right things," she said, "they still have a long way to go." □

► SWITCHING SYSTEMS

Ericsson, Elektrisk ink accord

BY STEFAN KARLEBO
Special to Network World

STOCKHOLM — Sweden's L.M. Ericsson recently created a joint venture with Norway's Elektrisk Bureau A/S for the marketing of private switching systems in Norway. Equally owned by the two companies, the new firm will market equipment for integrated voice and data transmission systems built around Ericsson's MD 110 private branch exchange.

Elektrisk Bureau is the largest supplier of PBX equipment to the Norwegian telecommunications authority.

The new company, named EB-Ericsson Information Systems, started operations July 1 and will initially employ 450 people. Annual revenues are expected to be approximately \$110 million. □

SNA users reap benefits of X.25

continued from page 9

In most cases, X.25 network access can be gradually added to an SNA network, giving users a flexible migration option to meet their networking needs. This allows for a smooth transition, with the SNA portion of the network retained as backup until the X.25 portion is operational.

Once implemented, an integrated X.25/SNA network can route data traffic more efficiently in a number of configurations. For example, a user with remote nodes that infrequently send data may consider a link to a public X.25 network to provide the same service as a costly dedicated line.

However, with this X.25 implementation, the user pays only the access cost, plus a cost for the amount of data transmitted. For links between high-traffic nodes, the user could build a private X.25 network.

An integrated X.25/SNA network also expands the connectivity options available to the user. For example, it is feasible to configure multiple paths across different network nodes to a single destination, creating a backup for critical data in the event of network or line failure.

In addition, an X.25 network can be used as a backup for an SNA network during peak demand periods.

The mix of X.25 and SNA for any network will depend on the networking environment and must be determined by the user. However, users should seriously consider implementing X.25 as a solution to existing networking problems, as an adjunct to their existing SNA network or as an alternative when expanding existing networks. □

Briefs from page 9

ny's Broadcast Division to its Farinon Division. The Broadcast Microwave Operation provides microwave equipment for electronic news gathering and studio-to-transmitter links. Farinon markets microwave systems and fiber-optic transmission equipment.

M/A-Com Telecommunications, Inc. signed a multimillion dollar contract with Computer Power, Inc. (CPI) for a Ku-band

private satellite net that will connect more than 500 Personal Earth Station terminals throughout the U.S. CPI will use the system for both internal data communications and to resell satellite hub services to companies in the Southeast, where its master hub will be located.

Innovative Software, Inc. signed an agreement with Allstate Insurance Co. for the provision of the Smart Software System, which

will be used in Allstate's domestic sales operations.

Tandem Computers, Inc. said it has purchased a minority investment in **Netlink, Inc.**, a privately held vendor of Systems Network Architecture hardware and software.

Terms call for the two to develop and market products that will integrate Tandem Computers Non-stop systems and IBM systems over SNA. □

TELECOM TRENDS

“Many users have requested that AT&T provide systems that bypass their local BOC. AT&T's reaction to these requests is a function of whether the user's account team really believes they are in jeopardy of losing this business.

Joaquin Gonzalez
Vice-president of enterprise networking
Gartner Group, Inc.
Stamford, Conn.

► MEGANETWORKING

Utility tabs Harris for net overhaul

Deal involves fiber, microwave links.

BY BOB WALLACE
Senior Editor

SAN DIEGO — Harris Corp. has begun the installation of a private voice and data network that will eventually serve 6,800 San Diego Gas & Electric Co. (SDG&E) employees at company facilities throughout Southern California.

In the networking project, Harris will install a two-cable fiber-optic ring that connects SDG&E's headquarters facility here with six other SDG&E buildings in the metropolitan San Diego area.

Voice and data traffic from the company's remote sites will be routed to a Harris 20/20 private branch exchange, configured as a tandem switch, over a digital microwave net to be installed by Harris. Harris wrested the multimillion dollar net project from AT&T, NEC America, Inc. and ConTel Business Networks.

The voice and data system will

augment the utility's current analog network, which comprises both microwave links and twisted-pair wiring.

The 20/20 PBX/tandem switch will provide net users with four-digit extension dialing. The vendor's net bid also calls for the use of equipment provided by Tellabs, Inc. and Larse Corp.

Bruce Gorton, telecommunications services manager for SDG&E, said use of the tandem switch at the corporation's headquarters here will enable him to route calls in different patterns. Tellabs' D4 Digital Access and Cross-connect Systems (DACS) will enable Gorton to route data traffic onto various transmission facilities.

Once completed, the revamped SDG&E net will support roughly 5,000 telephone stations and will carry data back and forth between 1,800 workstations and the utility's data processing center at its

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CROSS TALK BOB WALLACE

Dispatches from the telecom front

Back to school. Ericsson has won several multimillion dollar private network contracts with large U.S. universities in recent months.

A wholly owned U.S.-based subsidiary of L.M. Ericsson of Stockholm, Sweden, the vendor has assembled a list of higher education users including the University of Arkansas at Little Rock, University of California at San Diego, Oklahoma State University (OSU) and, most recently, San Diego State University. The combined value of these four contracts exceeds \$24 million.

Ericsson may be targeting universities because telecommunications professionals there are often more willing than their corporate counterparts to select equipment on technical merit rather than vendor reputation.

Ericsson seems to be pricing its systems aggressively. Officials at OSU said the company

underbid other contract competitors and that low price was a major factor in the school's decision. Ericsson may be willing to price its private branch exchanges lower than other vendors' offerings to add to its base of U.S. users.

A percentage off the top. Although the telecommunications industry is awash in discussion of virtual network services — be it AT&T's Software-Defined Network service, MCI Communications Corp.'s V-Net or US Sprint Communications Co.'s VPN — analysts say current users of the services, such as Transamerica Information Services, put only a small percentage of their overall voice traffic onto the virtual network.

Many virtual network users continue to support large, often nationwide, private voice networks. Cost may be keeping users from putting traffic from smaller sites onto the virtual

networks, and users may be unwilling to relinquish full network control to the carrier.

Switch resale, the final Frontier... Frontier Telecommunications, a division of the Dallas-based Frontier Computer Corp., is boasting about stealing away a major PBX customer from Rolm Corp.

Frontier, which sells used communications equipment, said it recently signed a contract with Capital Bank of Dallas to provide the institution with a used AT&T switch that will replace the Rolm unit it currently uses.

A spokesman for the used PBX dealer said users can save anywhere from 20% to 60%, depending on the equipment, by buying or leasing used AT&T PBXs instead of purchasing the switches new.

Merger mania. The Williams
See page 12

► KEY TELEPHONE SYSTEMS

TIE offers cash-back guarantee

SHELTON, Conn. — TIE/communications, Inc. has announced a 90-day, unconditional, money-back guarantee on its Ultracom line of key telephone systems and digital hybrid systems.

Under the terms of the agreement, TIE will take back any of its Ultracom telephone systems that do not meet performance criteria listed in product literature for a period of 90 days from the date the system becomes operational.

The vendor said the complete purchase price of the equipment will be refunded to the user.

Applies to entire Ultracom line

The TIE 90-day guarantee applies to the entire Ultracom product line, which addresses the under-200-station telephone system marketplace.

These products include the Ultrakey 16, Ultrakey 32, Ultracom AT, Ultracom DCX and Ultracom Datastar systems. □

Harris overhaul

continued from page 11

headquarters, Gorton estimated.

The Harris 20-20 PBXs will perform little data switching. Most data will be passed over one or more microwave links to the fiber-optic ring and on to the firm's computers.

Prepared with the assistance of Fluor Corp., an Irvine, Calif.-based communications consulting firm, the SDG&E request for proposal, distributed last December, specified a fiber-optic cable loop to serve the utility's metropolitan locations and a digital microwave net to serve outlying sites.

SDG&E sought to upgrade aging analog microwave systems used in

its current net while reducing communications costs. The user would not predict savings associated with the use of the digital microwave net.

Gorton said old microwave systems used in the company's net had become difficult to operate

he said. This includes acquiring licenses from the Federal Communications Commission and performing certain site development tasks.

SDG&E initiated an internal communications needs study, which also sought to explore the cost and service issues associated

tenance departments helped evaluate net proposals.

"Harris was awarded the bid because it rated highest in the technical evaluation and was also the lowest bidder," Gorton said. "Vendor responses were rated with respect to how they met the net specifications in the RFP."

Asked why SDG&E has opted to maintain and improve its private statewide communications network, rather than replace the system with a collection of switched services provided by local and inter-local access and transport area carriers, Gorton said, "Our network must be redundant, and it has to serve many remote locations not adequately served by [long-haul carriers]."

Gorton said SDG&E's current communications network features PBXs from many different vendors, including AT&T and Northern Telecom, Inc. One Northern Telecom SL-1, tied to the existing network, runs an automatic call distributor system, which routes incoming calls to agents at the company's customer information building.

Although most of the SDG&E communications network falls within state boundaries, it does not use Pacific Bell Centrex services. The utility does, however, make use of certain Pacific Bell leased services. □

"Harris was awarded the bid because it rated highest in the technical evaluation and was also the lowest bidder," Gorton said. "Vendor responses were rated with respect to how they met the net specifications in the RFP."

and maintain.

The company's engineers and operations staffs had already done much of the groundwork necessary to implement microwave systems,

with several types of voice and data networks. After receiving vendor responses to the RFP in March, members of SDG&E's engineering, and operations and main-

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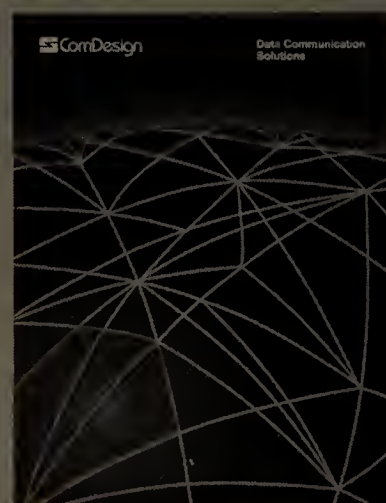
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Dispatches from the front

continued from page 11

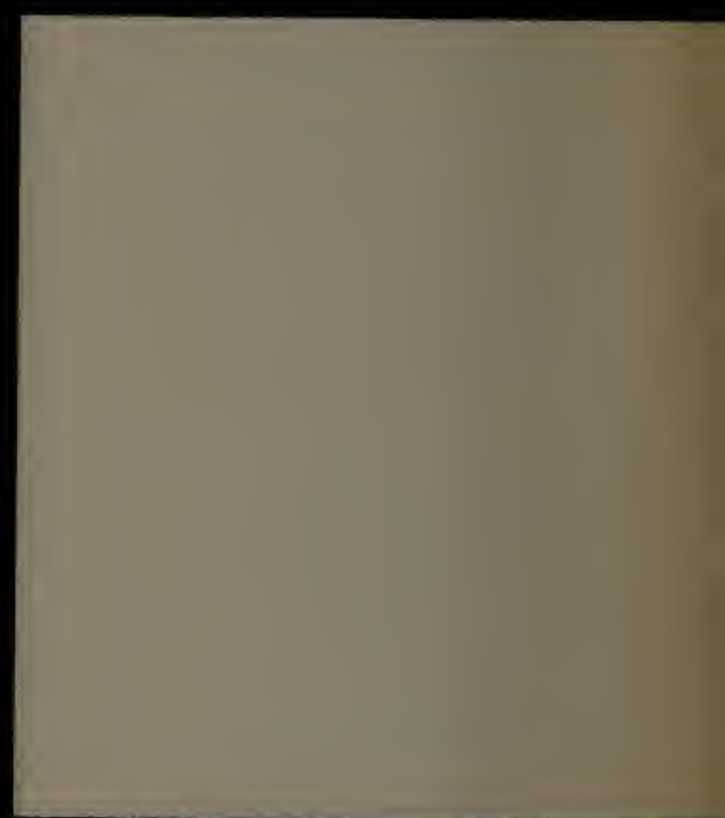
Companies, Inc. and Kansas City Southern Industries, Inc. (KCSI) recently signed an agreement, effective immediately, to combine two regional fiber-optic carriers — Williams Telecommunications Co. (Willtel) and LDX Net, Inc., which is owned by KCSI.

Under the terms of the agreement, Williams will provide \$95 million in funding for the new company and will own about 81% of the unit. Through LDX Group, KCSI will own the remaining portion of the company. The new company's board of directors will comprise two members from KCSI and eight members from Williams.

Get the picture? Videoconferencing was supposed to enjoy rapid growth because it offers users a way to cut travel costs. But to date, only the largest corporate users have chosen to meet via videoconferences. At least one video coder/decoder vendor acknowledges that the high cost of setting up a video conference room, or studio, is the biggest impediment to widespread acceptance of the technology.

Virginia Proctor, vice-president of marketing for Avelex, a start-up coder/decoder vendor, said cost has kept smaller corporations from embracing the technology. "Although the technology has been around a long time, this is still a slow-growth industry," she said. "Videoconferencing will not be widely accepted until the early 1990s." □





DATA DELIVERY/ NET MANAGEMENT

“When we started the company, we thought that vendors like Rolm and Northern Telecom would address wide-area network management issues. They didn’t, so we were forced to extend our reach more than we wanted to. To our surprise, we now see network management as a major business opportunity.”

Roger Chrisman
Director of research and development
Network Equipment Technologies, Inc.
Redwood City, Calif.

► FRONT-END PROCESSORS

IBM 3720 cuts costs

BY PAUL KORZENIOWSKI
Senior Editor

Three early users of the IBM 3720 front-end processor report the device helped them cut communications costs and connect remote offices to central data centers.

The three users, General Electric Co., Niagara Mohawk Power Corp. and American President Lines, Ltd., are all satisfied with the 3720, which was announced in May 1986 and designed to support remote locations. The 3720 sup-

ports 60 ports and is a little brother to the top-of-the-line IBM 3725 front-end processor.

General Electric Co.’s Aerospace Business group in Valley Forge, Pa., supports a Systems Network Architecture network with connections to remote offices in Huntsville, Ala., San Jose, Calif., and nearby Philadelphia. The remote offices are linked to IBM 3090 and Honeywell, Inc. DPS 88 and DPS 82 mainframes at the central data center using Infotron Corp. INX 4200 and 4400 data switches as

well as 632 series and 900 series multiplexers.

Many of the remote users have ASCII terminals and access the IBM host environment through IBM 7171 protocol converters.

The company considered adding more protocol converters and multiplexers to the network last year when it was planning to tie a remote group of Digital Equipment Corp. VAX users to the network. “Sticking with the current approach would have been cost-effective in the short term,” said A.E.

Laholt, manager of communications networking at GE’s Aerospace Business group.

But Laholt was concerned with managing the network, a task that becomes increasingly difficult as the number of remote users grows. The company decided instead to extend its SNA network out to the remote sites and manage them with IBM’s NetView host network management package.

GE considered a product from a start-up company, but Laholt said he felt an established vendor would support remote users better.

GE installed IBM 3720 front-end processors in Philadelphia and Huntsville last December.

To date, GE is satisfied with the

See page 14

DATA DIALOGUE

JEFFREY HELD

How to purchase network design tools

This is the second of two parts.

Last week’s column defined terms associated with network modeling tools in an effort to familiarize users with the basics. In this week’s column, we will examine key features of making a purchase decision.

Modeling packages are used on a regular basis, making the quality and friendliness of the user interface important. The best types of user interfaces feature full-screen editing, choice of menu-driven or “expert mode” entry screens, and on-line help.

It is also important that information be entered in such a way that the same data can be used by several portions of the package without the need to reenter it and that results from one part of the package can be used as input to another. With some packages, output from a performance analysis has to be rekeyed into an optimization module. It is also quite useful to be able to display the results of runs graphically, to get a better feel for what the model is saying.

Any modeling package should be flexible enough to adapt to a variety of networks. Users should be able to enter traffic data without having to convert between packets, frames, characters and bits.

A good modeling package should also be capable of analyzing hybrid networks composed of combinations of multipoint, concentrator and packet networks without requiring extensive-

data reentry. Furthermore, the model should allow the user to modify protocols, tariffs, circuit and equipment characteristics, and performance objectives quickly and easily.

Modeling packages should be easy to use and easy to configure. Users of large networks should be able to load network data, including data on equipment sites, circuits and traffic, via file transfer, floppy disk or tape to minimize rekeying. In addition, the package should use a sufficiently high terminal data rate to allow rapid entry and display of results.

Models may be limited in the size of network they can analyze, due primarily to computing limitations in optimization and simulation algorithms. Personal computer-based models are becoming quite popular, but they introduce limitations on the number of sites that can be optimized in one run.

These limits, which are usually around 500 sites, are a result of the limited processing speed of personal computers. New workstations, such as the new microcomputers based on Intel Corp. 80386 microprocessors, offer processing power equal to that of low-end minicomputers and may significantly extend the limitations of microcomputer-based models.

Mainframe-based models can optimize very large networks; however, the cost of time-sharing can be daunting. One way to reduce run time is segmentation, in which the network is divided into regions prior to optimization. Since run times tend to grow as the square of the number of sites, segmentation reduces run times and usu-

See page 14

Vendor support for Open Systems Interconnect model

	Vendor				
Protocol	Data General Corp.	Digital Equipment Corp.	Hewlett-Packard Co.	IBM	Wang Laboratories, Inc.
X.400	A	S	A ²	A ¹	I
FTAM		I	I	I	I
Virtual Terminal		I	I		I
OSI Session	I	S	A	S	I
OSI Transport	I	S	A	S	I
OSI Internet		S	I	I	I
802.3	S	S	S		S
802.5				S	I
X.25	S	S	S	S	S

1. IBM has announced the delivery of X.400 in 3Q 1988 in Europe only.
2. HP has announced the delivery of X.400 in 4Q 1987 for the HP 9000 in Europe only.

Key S: Product is shipping
A: Product has been announced
I: Statement of intention issued

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

► PAGING SERVICES

Packet-switched beepers debut

BY JOY KALFOPULOS
Network World Staff

NEW ROCHELLE, N.Y. — The first commercially available nationwide paging service using a packet-switching backbone network was unveiled here recently by Contemporary Group.

Megamessage allows companies to keep in contact with traveling employees. Contemporary will initially offer the service in 15 U.S. cities in accordance with its Federal Communications Commission license. The company hopes to expand the service to 50 cities by the end of the year.

Contemporary Group, a New Rochelle, N.Y.-based telecommunications company, is offering the service via Tele-net Communications Corp.’s packet-switched data communications network.

Contemporary holds one of only two FCC licenses for paging services within the 900 MHz frequency band. MCCA National Satellite Paging holds the other license and provides a paging service via satellite.

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IBM 3720

continued from page 13

product and reported only a few minor installation problems.

Laholt has one outstanding concern about IBM's front-end processor line. "Our remote traffic is rapidly growing, and we could be upgrading to T-1 lines at some remote locations," he said. "We are concerned with how much power IBM will be willing to put out at remote sites." The IBM 3725 can support a T-1 line, but the IBM 3720 cannot.

The second user, Niagara Power, was searching for a way to cut its private-line charges when the IBM 3720 was announced. The utility company's network supports 3,300 IBM 3270 series terminals spread throughout upper New York state. A hodgepodge of leased-line circuits connected users to the central data processing site in Syracuse, N.Y.

Rather than using leased lines to support remote sites, the company wanted to concentrate data with front-end processors in Albany, N.Y., and Buffalo, N.Y., and install a T-1 line between the sites.

Rolm Corp. switches were used to control the T-1 line, so data from the two sites could be dropped off at the central site. The company planned to install IBM 3725 front-end processors at the two sites when the smaller front-end processor was announced. Bob Daggett, communications technical analyst at Niagara Power, said the 3720 was a less expensive alternative to IBM 3725s.

Niagara Power has been able to cut its leased-line costs from \$1,000 a month to \$350 a month by redesigning its network. The product also provided an unexpected benefit. "We were working with private lines and now have 64K [bit/sec] circuits. So we were able to cut network response time, which was one of our corporate mandates," Daggett said. "Response time has dropped from eight or nine seconds to three or four."

American President Lines, one of the world's leading shipping companies, headquartered in Oakland, Calif., was searching for a device to concentrate traffic from its Asian offices, spread throughout 12 countries, when the IBM 3720 was introduced.

The company's network links IBM System/36 mini-computers and IBM 3274 control units in the Asian countries to the Oakland

data center. American President Lines had been using statistical multiplexers to consolidate Asian traffic, which worked well until rapid network growth slowed network response time.

John Bischoff, manager of telecommunications technology planning at American President Lines, said the company thought the new IBM front-end pro-

cessor would improve network availability.

The company experienced only one minor installation snafu. When a power supply blew on a front-end processor in Taiwan, IBM had to fly in a spare part from Japan.

American President Lines plans to install 3720s in Singapore and the Philippines during the next few months. □

Network design tools

continued from page 13

ally gives results close to that obtained with unsegmented networks.

Of course, the most efficient, user-friendly model in the world is useless if its results are unreliable. Models must provide accurate results, both in estimating performance and cost. Tar-

iff data bases must be kept accurate and up to date.

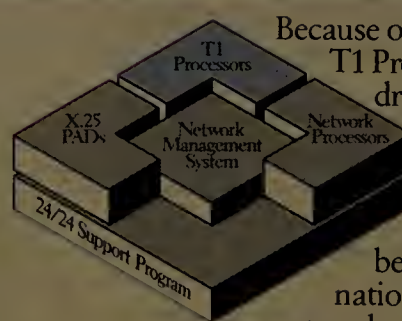
Time-sharing services are better able to do this, since they can be updated weekly, or even daily, as prices and tariffs change. Microcomputer models can receive updates as well, but these are usually monthly. If that is insufficient, then a user may be better served by time-sharing.

The evolution of model-



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ing packages is driven by technology as well as by trends in the telecommunications industry. One of the trends that seems clear is that desktop computing power is rapidly approaching the level needed for serious modeling activities.

The 32-bit desktop workstations with prices under \$10,000 provide the user with an opportunity to break away from main-

frame modeling systems and work in the friendlier confines of personal computing.

Another trend is the use of expert systems to enhance the effectiveness and user-friendliness of modeling packages. Modeling packages have traditionally been difficult for the nontechnical user to learn. Expert systems have the potential, as yet unrealized,

to provide a user interface that will allow less knowledgeable users to use models effectively.

Network models are an important tool for the network designer and manager, and users should select models with care. The true cost of a package may far exceed the purchase price, since the costs of training and maintenance should be considered. It is also impor-

tant to remember that a model is an approximation whose results are not guaranteed and that no model can incorporate the real world experience and knowledge of a veteran network designer.

A model is a tool, and a useful one. It is not a magical device that will somehow yield final network designs with no effort from the user. □

Beepers debut

continued from page 13

Megamessage was made possible by the "marriage of two technologies — paging and Telenet's packet switching," said George Ducra, vice-president of Contemporary. Telenet is US Sprint Communications Co.'s Vienna, Va.-based data communications company.

According to Ducra, customers create messages on terminals and send them through Telenet's packet-switching network to Contemporary's network control center in New Rochelle. That computer then routes the message via Telenet to a local paging system in the appropriate destination city, where it is then transmitted to the paging subscriber.

Contemporary will initially offer Megamessage in 15 U.S. cities for a basic monthly service fee of \$20 to \$25, plus a usage fee determined by the type of service package the customer chooses.

Howard Stern, director of product development at Telenet, said packet switching is more cost-efficient than transporting messages nationally via satellite, which requires construction of earth stations. Stern also said packet switching is more reliable than satellite transmission because satellites are affected by atmospheric problems.

The San Diego-based Metrocass, one of Telenet's customers, is in the process of putting together a nationwide paging service that would combine the Telenet packet-switching network and a satellite, Stern said.

He claimed, however, that Metrocass is using existing local paging systems that are saturated and having problems delivering pages in a timely fashion. Contemporary and MCCA National Satellite Paging, on the other hand, are using new equipment, not the in-place local paging system.

Mark Winther, director of electronic communications research at Link Resources Corp., said the relationship between Contemporary and Telenet offers the possibility of an international paging service as well as the integration of Telenet's electronic mail product, Telemail, with paging.

Stern said, "Those thoughts were in the back of our minds when we entered this relationship." □



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NETWORKING

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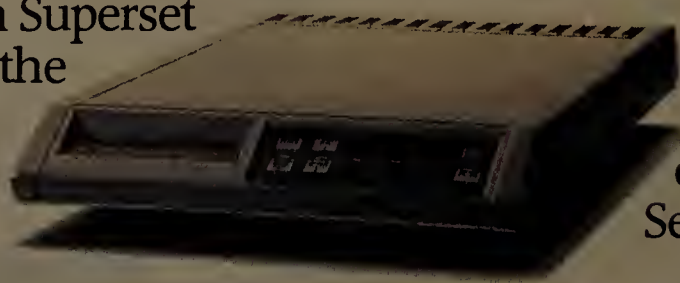
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LOCAL NETWORKING

“Because some frequencies in broadband networks perform better than others, all of the vendors try to use the prime frequencies in their modems. This makes it nearly impossible to use different vendors' modems on the same cable. So, while broadband promises this luxuriously wide bandwidth, the usable part of it is actually very narrow.

Greg Moore
Staff systems programmer
Bendix Aerospace Division
Allied Signal Corp.

User ratings of leading local-area networks Based on installed base of systems reported

	Ease of installation	Ease of expansion	Response time	Technical support	Vendor mainte- nance	Overall reliability
IBM	3.14	3.14	3.19	3.12	3.00	3.56
Digital Equipment Corp.	3.74	3.89	3.92	3.93	3.96	4.04
Novell, Inc.	3.74	3.74	3.58	3.26	2.94	3.79
3Com Corp.	3.73	3.64	3.00	3.18	3.00	3.73
AT&T	3.57	4.14	3.57	3.43	3.00	3.86
Sytek, Inc.	3.25	3.75	3.75	2.86	3.00	3.63
All vendors combined	3.46	3.52	3.51	3.23	3.19	3.76

Ratings are based on a scale of 1 (low) to 5 (high).

SOURCE: THE MARKET INFORMATION CENTER, INC., MARLBOROUGH, MASS.

NOVELL EXPLANATION

LAN Manager nixed

BY JOY KALFOPULOS
Network World Staff

OREM, Utah — Novell, Inc. recently released a statement explaining its refusal to license Microsoft Corp.'s LAN Manager network operating system for use with its local networking products.

In a 10-page report released in early July, Novell acknowledged that the introduction of Microsoft's Operating System/2 (OS/2), which was designed for IBM's new Personal System/2 microcomputers, and the introduction of LAN Manager will have a positive impact on Novell and the networking industry in general. Novell said it will support OS/2 at the workstation level, but the company added that it “does not intend to use OS/2 as a platform for a network operating system in the server and, therefore, won't license LAN Manager.”

IBM has not announced its plans regarding the LAN Manager. Novell rival 3Com Corp. has said it will work with Microsoft to develop and market the LAN Manager.

Novell said its NetWare network operating system currently offers key features outlined in the specifications for the LAN Manager and other features not yet specified.

Craig Burton, Novell's vice-president of corporate marketing and development and author of the report, said, “We have a functional equivalent in NetWare. Why would we throw that away for something that is less of a product? LAN Manager doesn't do everything that NetWare does.”

Novell's report says LAN Manager lacks such NetWare features as local internetworking, wide-area communications and broad connectivity support. This includes remote and local LAN bridges, asynchronous communications services, X.25 and Systems Network Architecture gateway services. In addition, Novell lists support for a

variety of LAN hardware protocols with transparent local and remote bridging, transaction tracking, and accounting and security controls.

The report said NetWare also offers support for disk storage volumes and files up to 256M bytes.

David Melin, product manager at Microsoft, said Novell's report is based on preliminary specifications for the LAN Manager and added that Microsoft has made no

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GROWTH OUTLINED

3Com execs plan tools, expansion

Firm's focus shifts to larger customers.

BY MARY PETROSKY
West Coast Correspondent

SANTA CLARA, Calif. — At a recent meeting for financial and industry analysts, 3Com Corp. executives revealed plans to roll out as many as 10 new products in the next 12 months and outlined plans to quadruple the size of the company by 1991.

Throughout the presentation, 3Com's top brass emphasized the company's transition from a local network component vendor to a supplier of work group computing systems based on network technology. Executives also said standards remain the foundation of 3Com's product strategy, and the company plans to implement Open Systems Interconnect (OSI) protocol standards.

3Com will also focus more attention on large corporate customers, according to L. William Krause,

3Com's president and chief executive officer. The company is establishing a major accounts program whereby 3Com will work more closely with its dealers, accompanying them on calls to major accounts. 3Com currently does not have direct sales and sells all equipment through dealers and resellers.

Analysts gave thumbs-up to 3Com's overall strategy and were particularly positive about the company's commitment to Operating System/2 (OS/2) as the basis for its next generation network operating system. However, at least one analyst questioned whether 3Com can provide the support and integration capabilities that customers are likely to demand.

Targeting large corporate users also means 3Com will have to improve connectivity options to mini- and mainframe computers, execu-

See page 20

LANMARKS PAULA MUSICH

LAN use today accents file sharing

A recent study by the Market Information Center, Inc. in Marlborough, Mass., showed the No. 1 reason behind the installation of local-area networks is to allow users to share files and data bases. Only a year or two ago, other studies found that the primary reason for installing personal computer networks was to let users share peripherals, such as printers, modems and hard disks.

Peripheral sharing requires much less sophisticated networking technology than sharing files and data bases. Sharing peripherals in a network is primarily designed to reduce equipment costs by spreading the cost of those peripherals across a greater number of users. The motivation behind sharing files and data bases is to enhance office productivity, and gains in that realm are difficult, if not impossible, to measure.

This shift in emphasis, which took place over a relatively

short time, can be attributed to the availability of file server software — rather than disk server software — and a few types of applications that take advantage of the distributed architecture of local networks.

Many industry observers said a lack of network-compatible applications has slowed the advance of local networking. The availability of DOS 3.0 and IBM's Network Basic I/O System were supposed to change that, but users are still waiting for truly distributed applications — especially distributed data base management systems.

What many observers don't take into account is the lack of multiuser software expertise at companies that previously only wrote single-user, stand-alone applications. Pundits overestimated the ability and the willingness of software houses to recognize the importance of personal computer networks and to adapt their products to the local net environment.

For example, Lotus Development Corp., the most influential microcomputer application developer, still hasn't made a networking version of its 1-2-3 spreadsheet available. Ashton-Tate, the micro data base king, implemented minimal networking capabilities in its dBase III+, much to the disappointment of networking users.

Now, with the introduction of the Operating System/2 for IBM's Personal System/2 and Microsoft's LAN Manager, there is a new “platform” for developing “truly distributed applications,” according to Microsoft and 3Com. This new platform won't be available until some time next year, at which point the applications developers will — users hope — go to work.

DOS 3.1 and NETBIOS, with all of their limitations, never lived up to their original promise, and now users find themselves waiting, once again, for software developers to deliver on new promises. □

3Com plans

continued from page 19

tives acknowledged. "It's essential we make a quantum leap" in the area of host and wide-area connectivity, Krause said.

In the short term, 3Com is looking to a soon-to-be-announced joint marketing agreement with Digital Communications Associates, Inc. (DCA) as the means to strengthen ties to IBM hosts. 3Com is in the process of certifying DCA's Irma-LAN family of host connections with the latest version of its 3+ network operating system, according to Douglas Pollack, director of corporate marketing.

In the long term, 3Com hopes to maintain a technically competitive

edge through acquisitions, particularly in the software area, Krause said. "Our ambition is to become a \$400 million to \$600 million company by 1991. The fuel for long-term, continued growth is the introduction of innovative products," Krause added.

Although reluctant to talk about unannounced products, Krause said a number of previously announced products would ship in fiscal 1988, which began June 1. These include an Ethernet adapter compatible with the micro channel of IBM's new Personal System/2 microcomputer line and a server based on the high-power Intel Corp. 80386 microprocessor. 3Com will also introduce a new network operating system based on OS/2

and the LAN Manager. 3Com is developing the LAN Manager jointly with Microsoft Corp.

The OS/2-LAN Manager combination "offers tremendous potential for performance and sophisticated application development," said Rick Kimball, senior research analyst with Montgomery Securities, a San Francisco-based investment banking firm. "The problem is, it's a year off," Kimball noted.

Kimball and other analysts expressed concern about a possible dip in 3Com's sales as customers weigh whether to buy products today or wait for OS/2-based products. "Any time you have a product transition phase, people look to the new system and don't purchase today's technology," said Paul

Scherer, senior communications analyst for Robertson, Colman & Stephens, an investment firm in San Francisco. Kimball said 3Com could lose momentum to Novell, Inc. in the interim.

During the meeting, analysts received a demonstration of a 3Com Ethernet currently in development that can run at 10M bit/sec over telephone wire. The product is scheduled to go into beta testing this summer and become commercially available in the fall, according to Glenn Goldberg, 3Com product marketing manager.

"The unshielded twisted-pair product is very important because it provides a quick wiring scheme," said Brad Baldwin, a Dataquest, Inc. industry analyst. However, 3Com will need to give its resellers some tools to test installed wiring to ensure it can be used, Baldwin said.

As part of its overall product direction, 3Com plans to expand its line by offering both entry-level and advanced systems. Entry-level systems will connect personal computers running MS-DOS and OS/2, with the main focus on communications within the work group.

3Com intends to enhance its existing DOS-based 3+ network operating system, according to Krause, who added that the life cycle for 3+ and other network operating systems is about five years.

The advanced systems will connect diverse workstations, including IBM Personal Computers and compatibles, Apple Computer, Inc. Macintoshes and Unix-based workstations, according to Krause.

Advanced systems will also offer host connections and advanced network management. The capability to support various types of computers and communications protocols is part of a strategy to provide an open architecture.

3Com currently supports Xerox Network Systems (XNS) and will continue to do so even after OSI protocols are introduced, said Robert Bressler, vice-president and general manager of the 3Com's Software Products Division. In addition to XNS and OSI protocol stacks, 3Com is also committed to supporting the 802.2 interface and its attendant protocol stack. □



"...I'm looking for vendors who take a systems approach to networking.

And I find them in *Network World*..."

Robert Stark is Manager of Network Operations for Litton Industries of Beverly Hills, California. He supervises the company's voice network analysts as well as those analysts who provide telecommunications consulting services to Litton divisions.

In this position, he is also charged with establishing specifications and making recommendations for the purchase of network communications equipment. And in order to carry out these responsibilities, Robert turns to *Network World*.

"Reading *Network World* definitely helps me in my job. I get crucial information about the viability of certain vendors, which lets me know if I should enter a business relationship with long-term expectations. In my job I'm looking for vendors who take a systems approach to networking. And I find them in *Network World*, which covers networking from a systems point of view.

"*Network World* is required reading for my department. That's because it provides total coverage of all levels of networking. Whether it's voice, data, local area, or wide area, *Network World* has it covered. It's our primary source for information on user trends and emerging technologies as well.

"Full of stories of actual user experiments and successes, *Network World* is also a great source of ideas for getting the most from our systems.

"Everything — including the ads which provide additional information on vendors and products — contributes to the overall value of *Network World*."

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An IDG Communications Publication

LAN Manager

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announcements outlining the operating system's specific capabilities.

Executives at 3Com said Novell is comparing LAN Manager's capabilities with those offered by a number of Novell products. "They're really comparing apples and oranges when comparing the entire NetWare product with the core LAN Manager product," said Doug Pollack, 3Com's director of corporate marketing.

Pollack emphasized that Novell's comparison is based on core product specifications for LAN Manager that outlined only the file and print server components. He said 3Com will provide the LAN Manager with, for example, inter-networking capabilities. □

COMMUNICATIONS MANAGER

“The cost of premises cabling represents a small fraction of a building's construction cost. If the job is not performed properly, however, the long-term costs can be exorbitant.

Ben Occhiogrosso
Vice-president
DVI Communications, Inc.
New York

► USERS GROUP

BICSI guides distribution system plans

*Union of telephone workers
and university serves all.*

BY MICHAEL FAHEY
Senior Writer

TAMPA, Fla. — An unusual alliance formed 13 years ago between a group of telephone company employees and a Florida university has evolved into an 800-member organization serving communications users, vendors and consultants.

The Building Industry Consulting Service International, Inc. (BICSI) is made up of professionals concerned with telecommunications cabling and other low-voltage wiring in businesses and multiple-family buildings. In addition to telecommunications professionals, the organization is open to electrical engineers, architects, interior designers and others working in the building industry.

“We are a professional organization that educates people to design distribution systems in a more efficient and economical manner,” said Larry Romig, executive director of BICSI and program coordinator at the University of South Florida's School of Extended Studies here. “These systems have become more complicated with the advent of data communications. In

Profile of Building Industry Consulting Service International, Inc.

Association of professionals concerned with efficient, safe and economical distribution of telecommunications and other low-voltage cabling

- 800 members worldwide
- Organized in 1974

Membership includes:

- architects
- electrical engineers
- interior designers
- telephone company employees
- consultants
- end users

SOURCE: BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL, INC., TAMPA, FLA.

addition, many environmental systems, alarm systems and intercom setups run off low voltage.” Most BICSI members are primarily concerned with wiring for communications systems, Romig said.

“They are concerned with inside wiring and with other distribution systems,” he said. “BICSI is concerned with distribution systems from the point [the system] leaves the carrier until it reaches the terminal.”

The term “building industry consultant” has been in use for some 20 years, and people performing that function were employed by telephone companies as long as 40 years ago, Romig said.

“It was a free service provided by the large, regulated telephone companies,” he explained. “By and See page 24

DIALOGUE

Is the position of chief information officer (CIO) an evolving one, or is the CIO concept mostly hype?

“I think it is an evolving position and one that is needed in many organizations. What is needed is someone with a business background and enough technical knowledge to understand the recommendations that are made by more technical staff members. The CIO does not need to have a deep technical background.

I think that the CIO is needed because, too often, you have people advancing through the ranks of data processing or through corporate information systems. They are too technically oriented and don't have an overall view of the corporation's operations and goals. It might be something I might aspire to when I get more of a technical background. I have a business background.

Dyanna Winn
Director of telecommunications and office systems
Bergen Brunswig Corp.
Orange, Calif.

“There is certainly a great deal of talk about the title of CIO. 1 See page 24

ASSOCIATIONS

The National Association of State Telecommunications Directors (NASTD) will hold its annual meeting Oct. 18-23 at the Pheasant Resort Hotel in St. Charles, Ill.

Gary Nelson will be keynote speaker. Nelson, chief scientist at National Semiconductor Corp., will discuss the role of states in telecommunications standards. Also scheduled to speak is Jeffrey Hill, principal with Network Strategies, Inc. of Fairfax, Va., and William Gallagher, vice-president of the Pacific division of MCI Communications Corp.

Roundtable discussions will also be held on topics such as telecommunications legislation in the states, moderated by George Christenberry, president of NASTD; contracting for state telecommunications services, moderated by Sam Rule, second vice-president of NASTD; and telecommunications and data processing, moderated by George Des Autels, telecommunications manager for the state of Virginia.

In addition, the conference will feature a trade show and speakers from AT&T, IBM and Electronic Data Systems Corp. ▢

GUIDELINES

ERIC SCHMALL

Using technology inside and out

In many organizations, lack of cooperation between the communications manager and the marketing and sales departments forms a barrier to the strategic use of communications technology.

Stories abound of corporations enhancing their market share by installing point-of-sale terminals or winning new customers through the creative use of inward WATS networks. The cases of American Airlines' Sabre system and American Hospital Supply Corp.'s customer premises-installed terminals are well-known. Now, it seems everyone is talking about using communications to elbow out the competition.

Unfortunately, little attention has been focused on the internal organizational dynamics neces-

Schmall is network systems manager for an insurance holding company.

sary to make all of this happen effectively. To begin with, personnel from two seemingly disparate business disciplines — marketing and communications — must become more familiar with one another. The communications manager should take the lead in this process.

The communications manager should learn fundamental concepts of sales and marketing and the particular goals of his organization's sales and marketing groups. The manager then must study what makes those groups similar or dissimilar to their counterparts in other firms. In particular, the manager needs to find companies in the same industry that are exhibiting marketing advances and whether they are using innovative technology to help those efforts.

The key step in finding this information is to meet with the marketing department on a for-

mal basis to exchange ideas. As part of that exchange, the communications manager should offer to brief the marketers on any new technology that can help them meet their goals.

These meetings may be difficult at first. A common language must be found so that both sides can achieve a strategic alliance. The communications manager should expect resistance because old ways die hard and marketing and sales personnel may resent the communications manager's efforts to become involved in their area of expertise. Also, many people are fearful of technology.

Once these obstacles are overcome, however, the rewards for the entire organization will be great. Communications has evolved from being a business expense to a resource, but only in organizations that skillfully integrate it into their overall business plans. ▢

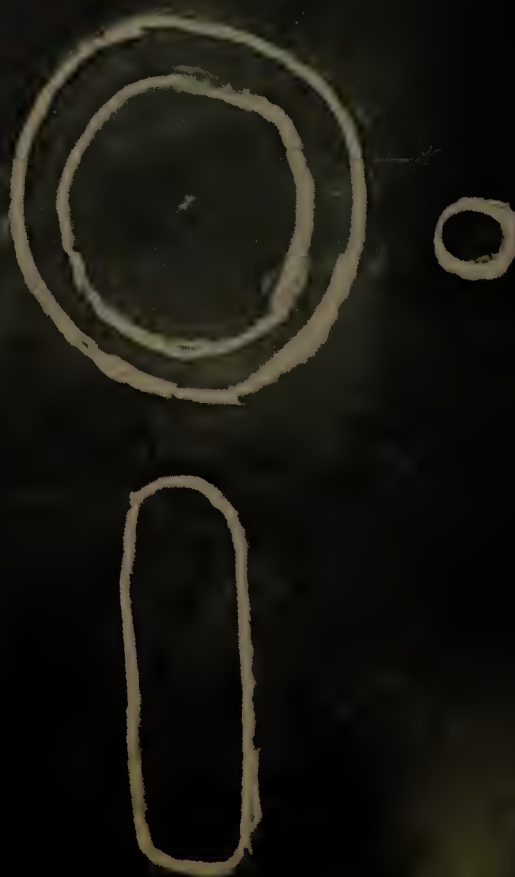
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Smartcom III's menu-driven format is ideal for novices because they can conduct communications activities through the aid of on-line help facilities.

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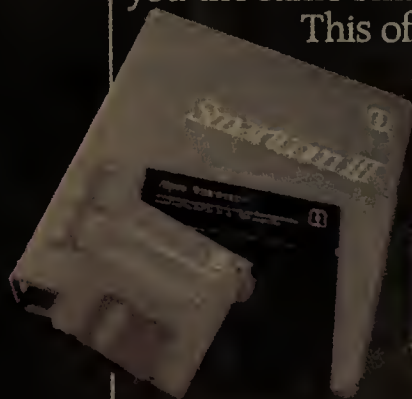
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BICSI guides system plans

continued from page 21

large, telcos were regulated as to how much they could charge for installation. If they could install a telephone system in an efficient and aesthetic manner, it was good for them and the customers."

In 1965, a group of building industry consultants began holding a series of

meetings at the University of Kentucky in Lexington, Ky. In the early '70s, Harry Pfister, a Tampa-area building industry consultant, enlisted the aid of Romig and the University of South Florida's Center for Continuing Education, now the School of Extended Studies, in organizing a

conference of industry consultants.

In 1974, the group formally created BICSI. The organization has continued its relationship with the university, which provides full-time staff and office space for BICSI.

"The University and BICSI have a unique, symbiotic relationship," Romig said. "The University gains a great deal of exposure in

the industry through BICSI. This is what continuing education is all about."

BICSI's membership ranks swelled after AT&T divestiture, and each year the number of members from end-user organizations grows, according to Romig. "Divestiture has changed the business as far as the players were concerned, and technology

keeps changing the industry as far as equipment is concerned.

"In this age, in the deregulated environment, the end users have to be able to protect themselves and get the best distribution system," he said.

The organization now offers a certifying exam for communications distribution professionals. Members who have two years of experience designing or installing communications distribution systems can take the two-hour exam. If they pass, they are certified as registered communications distribution designers (RCDD).

"We are starting to see companies publish RFPs that require that their systems be designed or inspected by an RCDD," Romig said.

The organization sponsors three conferences per year, one each in Tampa, Scottsdale, Ariz., and Lexington. The organization also serves as a clearinghouse, connecting users and vendors with building industry consultants.

BICSI has published a distribution system manual. *The BICSI Telecommunications Distribution Methods Manual* is available to members for \$72 and to nonmembers for \$99.

"We want people to know that there are a variety of distribution systems," Romig said. "We want them to know the advantages and disadvantages of those systems and that there are ways of measuring the life-cycle costs of communications distribution systems." □

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Dialogue from page 21

think that it actually is an evolving position. Information is now a very important asset for corporations, and they need someone who understands technology and the wider business concerns.

Charles Wong

Applications support manager
Data processing
Home Savings of America, F.A.
North Hollywood, Calif.

"We just appointed one. I think it is mandatory in any middle-sized to large corporation. There is a real need for someone who has technological expertise and, at the same time, the business knowledge to use it to help solve critical business needs.

Ken Patterson

Network manager
American Medical
International, Inc.
Los Angeles



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NEW PRODUCTS AND SERVICES

See inside for:

- ▶ Astrocom fiber-optic mux
- ▶ Asher fax for Mac
- ▶ Microcom modem security

► COMMUNICATIONS RESEARCH

Software automates logon, file transfer

BY JIM BROWN
New Products Editor

BATON ROUGE, La. — Communications Research Group recently announced an enhanced version of its PC Blast communications software that enables users to automate such communications functions as remote logon to a host and file transfer.

With PC Blast II's new superscript language, users are able to configure an IBM Personal Computer or Apple Computer, Inc. Macintosh for unattended asynchronous communications with a host system running Blast software. The PC Blast II software makes use of existing direct links to hosts, or dial-up, leased line or X.25 packet-switched connections. Blast software is available for 31 different host computer operating systems.

The new package can also trim X.25 line usage charges by providing control over the size of data packets being transmitted; most carriers charge a per-packet service fee. PC Blast II was also upgraded to support menu-driven commands rather than

command line level commands supported in earlier versions.

Blast packages convert text and data formats between systems. When linking a personal computer and a Digital Equipment Corp. VAX minicomputer, for example, Blast will convert the personal computer's MS-DOS file format and data structure to that used by the VAX.

The PC Blast II package also provides emulation of DEC VT-100 or TTY type terminals.

The firm is also offering a Blast II version for multiuser computers operating under the Unix or Xenix operating systems, as well as Blast II versions for Digital Equipment Corp. VAX and MicroVAX computers. Sold through nationwide resellers and distributors, the PC Blast II package retails for \$250. Blast II packages for Unix and Xenix operating systems retail for \$395, while versions for VAX and MicroVAX systems range from \$495 to \$1,295.

Communications Research Group is located at 5615 Corporate Blvd., Baton Rouge, La. 70808, or call (504) 923-0888. □

► NOVELL

NetWare E-mail bridge bows

Gateway allows communication between LANs.

BY JOSH GONZE
Staff Writer

PROVO, Utah — Novell, Inc. recently unveiled an electronic mail gateway that permits users of NetWare-based local networks to exchange messages and documents with users of other common E-mail systems, including IBM's DISOSS and Digital Equipment Corp.'s All-In-1.

The gateway program, dubbed "Mailbridge Server/The Coordinator," will be distributed by Soft-Switch, Inc. and is designed to work in conjunction with similar gateways Soft-Switch sells for other mail systems.

To link two E-mail systems, a user must buy a Soft-Switch gateway for each system.

With the proper gateways in place, users of NetWare-based networks exchange messages with users on other networks by specifying addressee and system name. End users do not have to know special routines to exchange messages with end users on other local networks.

Mailbridge/Coordinator, running on a dedicated personal computer, takes the proprietary format of NetWare's E-mail messages and translates it into the common format understood by the Soft-Switch E-mail gateways on other networks. The gateway on the receiving network takes

the messages and translates them into that system's proprietary E-mail format.

In addition to DISOSS and All-In-1, Soft-Switch currently offers separate interfaces for IBM's Professional Office System, DEC's VMsMail, Wang Laboratories, Inc.'s Mailway and Office, MCI Communications Corp.'s MCI Mail, all Soft-Switch systems and all systems compatible with IBM's Systems Network Architecture Distribution Services.

A spokesman for Soft-Switch said Mailbridge/Coordinator handles all three levels of compatibility required for mail system links: communications protocol, envelope and address, and message text.

The common format defined in all Soft-Switch's Mailbridge Server products is based on IBM's Document Content Architecture, a standard for linking systems together.

Mailbridge/Coordinator requires an IBM Personal Computer XT or AT with 640K bytes of memory, a Cleo Software 3780Plus board with Syncmodem 201 and a network interface card compatible with Novell Advanced NetWare.

Soft-Switch said the gateway will be available late in the third quarter and will cost \$3,000.

Soft-Switch is located at 955 Chesterbrook Blvd., Wayne, Pa. 19087, or call (215) 640-9600. □

► SYSTEM MANAGEMENT

Able enhances Attach switch

BY JIM BROWN
New Products Editor

COSTA MESA, Calif. — Able Computer recently enhanced its 3,000-port Attach data switch with new software that enables users to access system management functions currently available on the firm's newer 480-port Micro Integrated Network Exchange (MINX).

The Resource Manager software resides on a board that plugs into the Attach chassis. It enables the 3-year-old Attach system to employ the same system management tasks supported on the firm's 4-month-old MINX data switch.

The Resource Manager allows system administrators to control full-duplex connections between asynchronous terminals and various asynchronous hosts, printers and other peripherals. Attach supports speeds up to 1M bit/sec over two twisted-pair wires. The Resource Manager replaces the Attach's existing Supervisor II software, which works in conjunction with host-resident Lanswitch software. The new software consolidates both software pieces on one board.

With the Resource Manager, system administrators assign users to any of up to 128 classes of service. The new software links users only to the devices within their class of service. Additionally, the new software allows end users to establish multiple connections and to request to be placed in a queue with up to 15 other users waiting for access to a busy device, functions not supported on previous Attach systems.

Both the Attach and MINX systems are configured from an attached asynchronous terminal. System administration tasks can be assigned as a class of service, thus enabling authorized users to change system configuration from designated ports.

Other new functions supported by the Resource Manager include the ability to require a password to access the switch and another to access a host.

The Resource Manager supports diagnostic routines that test the twisted-pair links to each host or group of terminals. It also retains a configuration data base and an activity log detailing when each connection was made and terminated. Those logs can be directed to a switch-attached printer.

The firm also announced its MuxLink module, a 480-port expansion module that integrates the firm's MuxMaster products with the Attach switch. Included in that product family are eight- and 16-port MuxMaster asynchronous terminal servers, Multi-Cluster terminal cluster controllers and MuxMaster/LP line printer cluster controllers. The line also supports Digital Equipment Corp.'s Q-Bus or UNI-Bus 128-port host interface boards.

The MuxLink module includes four synchronous ports, each of which supports up to 128 individual asynchronous channels operating at speeds up to 38.4K bit/sec. Each MuxLink port, therefore, supports a string of either eight 16-port, 16 eight-port MuxMaster terminal or printer servers, or a 128-port host interface board.

The MuxMaster components wrap individual asynchronous channels in a High Level Data Link Control synchronous protocol transmitted to the At-

See page 27

► T-1 MEASUREMENT

TelWatch ups NetWatch

New functions added to net manager.

BY JIM BROWN
New Products Editor

BOULDER, Colo. — TelWatch, Inc. recently enhanced the T-1 management functions of its NetWatch network management system and doubled the number of T-1 lines it supports.

The T-OneWatch interface for NetWatch now supports up to six T-1s and is capable of monitoring voice channels within the T-1 as well as the condition of the entire T-1 pipe.

T-OneWatch consists of a stand-alone chassis capable of supporting up to six LT301 boards and monitoring software. The system monitors T-1 links as they enter or leave a channel service unit (CSU), and it physically connects to T-1 lines through a bantam monitor jack on the CSU or through a cross-connect on a telephone punch-down block.

T-OneWatch monitors T-1 conditions as they occur. Data is displayed on an asynchronous terminal or personal computer attached to the system over an RS-232 link at either 15-minute or one-hour intervals. The system can also be configured to automatically produce a message on an attached printer whenever certain user-defined thresholds have been exceeded.

Among the new measurements gathered by the system is the num-

ber of times data retransmission is required. That information can point out degrading line conditions. The previous version detailed retransmissions received with errors.

Also added is the ability to measure how many times retransmitting was due to poor line conditions.

Other new capabilities include the ability to monitor DS1 framing bit error rates, the number of times the receiving and transmitting ends of the T-1 line were not in sync and the number of excess binary zeroes that are received each hour.

The new software is also compatible with T-1 extended superframe, which enables the system to monitor the cyclic redundancy check error-checking scheme.

Measurements supported on previous versions include the number of bipolar violations, carrier loss, carrier loss duration and the number of times data was transmitted out of frame.

Available in either three-line or six-line versions, the T-OneWatch component of NetWatch will range in price from \$4,100 to \$18,300 when released in September. Current T-OneWatch users can upgrade to the new functions for \$250 per board.

TelWatch is located at 2905 Wilderness Place, Boulder, Colo. 80301, or call (303) 440-4756. ☐

► PACER SOFTWARE

Micro-to-VAX link bows

LA JOLLA, Calif. — Pacer Software, Inc. recently announced a version of its pcLink software that enables IBM Personal Computers and Apple Computer, Inc. Macintoshes to link to a Digital Equipment Corp. VAX minicomputer over an Ethernet local network.

Micros with pcLink can transfer ASCII and binary files to a VAX outfitted with a complementary copy of pcLink at speeds up to 800K bit/sec.

The new release is compatible with 3Com Corp.'s 3C501 or 3C505, or with Micom/Interlan, Inc.'s NI5010 microcomputer Ethernet adapters.

Using pcLink for the Macintosh, users of the Macintosh 512, Macintosh 512e, Macintosh Plus, Macintosh SE and Macintosh II models can transfer ASCII, binary and MacBinary files with the VAX at up to 80K bit/sec.

The software works with Kinetics, Inc.'s FastPath, a bridge between the AppleTalk local net and an Ethernet local net, and also with Kinetics' EtherSC, a small computer systems interface that directly links the Macintosh to Ethernet.

Besides running a VAX copy of

pcLink software, the VAX must be equipped with a standard Ethernet controller card. The pcLink for the VAX software supports existing DECnet hardware and software.

Additionally, the new release enables Personal Computers and Macintoshes to use DEC's VAX-resident All-In-1 office automation software.

Since its release in 1984, pcLink enabled Personal Computers and Macintoshes to connect to VAXes using asynchronous RS-232 links, terminal servers or modems. Those links supported file transfers at speeds up to 9.6K bit/sec.

With pcLink, Personal Computers and Macintoshes appear to the VAX as a DEC VT-100, VT-220 or VT-241 terminal. Personal Computers and Macintoshes are able to create virtual disks on the VAX, in essence turning the VAX into a file server for connected devices.

The pcLink software has a site license fee of \$2,000. That license includes pcLink for the VAX and an unlimited number of Personal Computer and Macintosh copies.

Pacer Software is located at 7911 Herschel Ave., Suite 402, La Jolla, Calif. 92037, or call (619) 454-0565. ☐

First Look

Fiber-optic local net adapter board

Codenoll Technology Corp. and **Standard Microsystems Corp.** jointly introduced a card enabling personal computers to access an Arcnet local-area network over fiber-optic cable.

The **Codenet Fiber Optic Arcnet** board plugs into IBM Personal Computers or compatibles and attaches directly to the network's fiber-optic cable. It supports such network operating systems as Novell, Inc.'s NetWare, Banyan Systems, Inc.'s Virtual Networking System, Western Digital Corp.'s ViaNet and Torus System, Ltd.'s Tapestry.

Personal computers using the new board work in conjunction with Codenoll's Codestar Passive Optical Coupler and take advantage of Arcnet's baseband, token-passing local-area network technology deployed in a star configuration.

The Codenet Fiber Optic Arcnet board costs \$700.

Codenoll Technology Corp., 1086 North Broadway, Yonkers, N.Y. 10701, or call (914) 965-6300.

Four-port protocol converter introduced

JDS Microprocessing introduced a four-port version of its channel-attached protocol converter and terminal controller.

The four-port **Hydra** makes nearly all asynchronous ASCII terminals and personal computers appear to an IBM mainframe as IBM 3278 terminals. The product also makes serial ASCII printers appear to the host as IBM 3286, 3287, 1403 or 3211 system printers.

The Hydra product line, ranging from four- to 64-port models, consists of boards that attach directly to an IBM mainframe channel. The product enables RS-232 devices to bypass terminal servers and front-end processors and directly attach to an IBM mainframe channel. The Hydra products act as servers for attached devices as well as protocol converters.

The four-port Hydra costs \$4,900. Other products range from \$7,900 to \$16,900.

JDS Microprocessing, 2266 Lambert St., Suite 206, El Toro, Calif. 92630, or call (714) 770-2263.

Multi-Tech introduces new 1,200 bit/sec modem

Multi-Tech Systems, Inc. introduced a new 1,200 bit/sec modem that supports Microcom, Inc.'s Microcom Network Protocol error checking scheme.

The **MultiModem212E** also operates at 300 bit/sec. The modem supports either synchronous or asynchronous transmission in full- or half-duplex mode over analog

dial-up lines. At 1,200 bit/sec, the modem uses Phase Shift Keying modulation. At 300 bit/sec, it uses Frequency Shift Keying.

In addition, the modem uses speed conversion, which allows it to operate at a fixed speed of up to 9.6K bit/sec through its RS-232-C serial port, as opposed to 300 bit/sec or 1,200 bit/sec speeds over phone lines. The modem also includes such diagnostics as local analog loop-back and remote digital loop-back.

The **Multimodem212E** costs \$339.

Multi-Tech Systems, Inc., 82 Second Ave. SE, New Brighton, Minn. 55112, or call (612) 631-3550.

Peripheral-sharing units introduced

Integrated Marketing Corp. introduced a pair of peripheral-sharing products that allow IBM Personal Computers and workstations to share printers and plotters as well as communicate with other compatible devices.

The **Data Manager 4x4** and **Data-Net 1551** are designed to allow personal computers and workstations to switch connections between serial and parallel devices, which can include printers, plotters, local-area network-attached personal computers and host systems. The Data Manager 4x4 is an eight-port system. It comes with four RS-232 ports on a single board and can be expanded with up to four additional single-port boards supporting either serial or Centronics-compatible parallel devices. The Data-Net 1551 is a six-port, RS-232 serial system.

The software for both products resides in erasable programmable read-only memory. That software allows users to configure the input port they are attached to and the output port they will communicate through.

Both offerings provide 256K bytes of random access memory, which can be expanded to 1M byte of RAM. They each operate at user-selectable speeds of up to 38.4K bit/sec.

Data Manager 4x4 costs \$795 per single unit, and Data-Net 1551 costs \$695 per single unit.

Integrated Marketing Corp., 1031-H E. Duane Ave., Sunnyvale, Calif. 94086, or call (408) 730-1112.

Fiber-optic mux supports mixed lines

Astrocom Corp. introduced a fiber-optic multiplexer designed to combine a mix of communications lines on a single fiber-optic link.

The **MegaPath Series 5000 Multiplexer** supports link speeds of 14M bit/sec or 28M bit/sec. The time-division multiplexer is reportedly capable of combining IBM 3274 or 3174 multiplexed cluster controller signals as well as multiplexed synchronous, asynchronous or T-1 signals on a single line traveling a distance of up to 2½ miles.

The product's components con-

sist of a chassis, a composite link module and up to four I/O modules. Among the I/O modules the device works with is an IBM 3270 module supporting 32 half-duplex channels received from a cluster controller.

The device also works with modules that support between 12 and 36 asynchronous RS-232 channels operating at 19.2K bit/sec each; modules supporting four T-1 lines; modules supporting 16 synchronous RS-232 channels operating at 19.2K bit/sec each; modules supporting eight synchronous V.35 channels operating at 64K bit/sec each; modules supporting four synchronous V.35 channels operating at 1.344M bit/sec each; and modules supporting eight synchronous RS-422 channels operating at 64K bit/sec each.

The product features three front-panel control buttons, an LCD display screen and diagnostic capabilities. The chassis also features front-panel LEDs indicating link status, channel activity and diagnostic procedures.

Pricing for the MegaPath Series 5000 Multiplexer starts at \$4,950.

Astrocom Corp., 120 West Plato Blvd., St. Paul, Minn. 55107, or call (612) 227-8651.

Modem call-back security device

Microcom, Inc. unveiled a controller that adds call-back security to its High Density Modem System (HDMS), which supports up to 32 of the firm's HD/2400 or HD/2400c modems in a single chassis.

The board-based **Call-Back Security Controller** resides in an HDMS chassis and prevents unauthorized access to a host computer by calling back remote modems.

It supports three types of call-back security: fixed call-back, variable call-back and pass-through access.

With fixed call-back, users calling into the system are required to enter a password. The controller hangs up the call, searches a data base for that password to find the telephone number assigned to it and then calls that number back.

The variable call-back is designed for users moving from one location to another. It enables users to enter a password along with the telephone number at which they can be reached. Once the controller verifies the password, it calls the provided number.

In pass-through mode, certain

users can be assigned a password that enables them to bypass the call-back provision and to enter the host system directly with one call.

Supporting a data base of 1,000 user passwords and supervising access to up to 192 modems, the board also provides a threshold alarm that detects repeated failed attempts to access the system with invalid passwords.

Pricing

The Call-Back Security Controller costs \$4,499.

Microcom, Inc., 1400 Providence Highway, Norwood, Mass. 02062, or call (617) 762-9310.

Unit enables Macintosh to send, receive facsimiles

Asher Technologies, Inc. introduced a stand-alone unit that enables Apple Computer, Inc. Macintosh computers to send and receive facsimiles.

The **JT Fax** can be used with the Macintosh 512K, Macintosh 512Ke, Macintosh Plus, Macintosh SE or Macintosh II to send or receive Group III facsimile transmission, including desktop publishing documents.

The product allows documents to be sent directly from a Macintosh storage disk and transfers received documents to the Macintosh memory or a disk file.

The product works with all Macintosh programs that use standard printer drivers. Among the product's features are an on-board speaker, LEDs for monitoring the send and receive activity, a carrying case and dual RJ-11c phone connectors, which allow the telephone to be used when facsimile transmissions are not being sent or received.

In addition, a phone directory system enables users to store an unlimited data base of facsimile numbers, while a transaction log keeps track of all incoming and outgoing messages.

The unit can also be programmed for unattended operation at night when the phone rates are lower.

Pricing

Developed in conjunction with Citizens Computer Center in Higginsville, Mo., the JT Fax costs \$695.

Asher Technologies, Inc., 1009-I Mansell Road, Roswell, Ga., 30076, or call (404) 993-4590.

Able enhances Attach switch

continued from page 25

tach switch over a 1M bit/sec half-duplex twisted-pair link.

The Resource Manager module routes each of the channels to the individual devices they requested. The MuxMaster component residing on the receiving device strips away the HDLC protocol to access the asynchronous channel.

The Attach system is capable of supporting up to six MuxLink modules, which support an RS-422

physical interface.

The cost to upgrade Supervisor II modules to the Resource Manager is \$1,500. A typical Attach system supporting 64 server ports and two 128-port host interface boards is priced at \$18,000. MuxLink modules cost \$4,000.

Able Computer can be reached at 3080 Airway Ave., Costa Mesa, Calif. 92626, or call (714) 979-7030.

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How do DDS options and pricing trends compare with their analog counterparts? *Network World* sheds some light on this timely question.

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Low-end PBXs offer greater functionality than do key systems, but when is it wiser to opt for a money-saving hybrid key system/PBX with fewer capabilities? This Product Focus helps users decide.

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Protecting sensitive information from unseen enemies both inside and outside the organization is no easy task. This Special Section works to sort it all out for *Network World's* 65,000+ subscribers.

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NETWORK WORLD

Opinions

NETWORK INTEGRATION

JAMES G. HERMAN

The metanetwork cometh

Most large organizations today face the problem of interconnecting multiple networks. For most firms, the legacy of two decades of growth in data communications has been a bewildering array of isolated and usually overlapping networks. Also, businesses are seeking a competitive advantage by linking their nets with those of their customers, suppliers and the government agencies that monitor, tax and regulate them.

As a result, many network planners are committed to net integration. For example, General Motors Corp., with more than 100 networks, is consolidating into as few networks as possible. It's working to develop a network utility — a single backbone that can carry all the organization's traffic and provide universal connectivity. The federal government's Federal Telecommunications System 2000 procurement and the Department of Defense's Defense Data Network are also products of this "one network" concept.

Although it's clearly necessary to reduce the number of networks and establish common protocols that make all elements of an organization's information infrastructure compatible, it's rarely possible to consolidate to one network.

Differences between technologies, such as in local-area, wide-area and satellite networks, are obstacles to total integration. Also, protocol and architectural barriers will remain for at least another decade, as the

Herman is principal consultant, Telecommunications Consulting Group at BBN Communications Corp. in Cambridge, Mass.

standardization process continues. Mixed use of public and private networks, especially for overseas access, further increases the number of networks with which companies must interact.

Yet, pressure is strong to interconnect all of these networks. The growth of distributed processing and the spread of low-cost mini-computers and microcomputers have increased users' desire for full connectivity. Cross-application data sharing and user demands for access to remote mainframe applications and data bases from terminals and personal computers are forcing managers to establish links between what were formerly application-specific networks.

Corporatewide electronic mail, document distribution and other common user services such as bulletin boards and on-line directories are additional reasons for giving most computer resources access to a shared, enterprise-wide network.

While it is not always possible politically to build a single network, fewer obstacles exist to internetworking. Through internetworking, connectivity can be achieved without loss of departmental control.

Most organizations take an ad hoc approach to internetworking, in which each internetwork link is treated as a special case requiring a unique black box or custom software module. Access control and security functions are cobbled together in response to loosely defined requirements, and monitoring and control capabilities are limited.

The key problem is organizational: It is difficult to define who's responsible for a

device that spans the networks of separate organizations or departments. A challenge for large network users in the next five years will be to drop the ad hoc approach and develop a long-range plan for an enterprise-wide metanetwork that comprises many different networks but creates the illusion of a single network.

In metanetworks, gateways and bridges will become increasingly important. Bridges are simple relays that pass compatible protocols and formats between physically disjointed subnetworks. Gateways, on the other hand, translate between dissimilar, closed architectures. In a network of networks, gateways and bridges act as switches, making routing decisions, buffering and repackaging data blocks, and implementing error and flow control measures.

An internet addressing standard is key to establishing metanetworks and may be the most important standardization goal for large users. In the future, a single addressing format must be implemented that will allow any device to address any other device worldwide. The International Standards Organization is now finalizing such a standard.

Network integration can go only so far in putting everything on one network. Incorporating the metanetwork concept into corporate communications architectures will increase the flexibility and extensibility of these networks.

In conjunction with addressing protocol standardization, adopting an internet architecture is one of the most pressing issues in planning for future network utilities. □

LOCAL-AREA NETWORKS

PAMELA RICHMOND

An ounce of planning

Buyers in the high-tech marketplace learn early — usually, the hard way — not to purchase any equipment without first asking detailed questions.

Buyers must investigate the features, capabilities, specifications and potential impact equipment purchases may have on their companies. A local-area network purchase, in particular, requires a thorough needs analysis and evaluation process to ensure optimum performance.

Because there can be so many variations to each local net theme, implying that there are "only a few questions to consider" is a gross understatement.

And these concerns can easily be compounded if the network being examined is to be integrated with existing equipment.

Richmond is vice-president of Technology Management Associates, a local net management consulting firm in Atlanta, Ga.

One of the first issues to consider when buying or expanding a local-area network is how to organize and structure your system approach. After all, you wouldn't consider building a house without a design. And building a local net without a plan is equally counterproductive. There are network management plans available that provide a systematic approach or check list that can help in the evaluation and implementation process.

A network plan should include input from potential vendors and from all available internal resources, including end users. The acquired information should be recorded so that the buyer can maintain good reference documentation on each local net and vendor evaluated.

However, this type of condensed approach is lacking in attention to the finer details. It needs to be expanded if the objective is to eliminate surprises when buying and in-

stalling a cost-effective local network.

By incorporating the following steps into the buying process, users can establish a more complete approach to the purchase and management of local networks.

- Interview key end users to establish information flow, departmental overlaps and user recommendations.
- Evaluate current applications and procedures to establish software needs.
- Organize and categorize all information available on the existing system.
- Evaluate the necessary hardware for application support and compatibility.
- Prequalify equipment and vendors with a request for information or a request for proposal.
- Develop a method for evaluating vendor proposals.
- Establish terms and conditions for installing and testing the equipment.

- Determine procedures for implementing and converting systems.
- Arrange for the training of personnel.
- Complete a postimplementation evaluation report to review system performance and expectations.

This approach is constructive, but it is only a rough outline. A thorough system-needs analysis is a far more complex and time-consuming process that documents the entire procedure for buying, implementing and managing a local-area network.

Sometimes a great notion goes unnoticed, unless you speak up. Send *Network World* a column for its opinions pages. Manuscripts must be letter quality, double-spaced and approximately 600 to 750 words in length. Disk and modem submissions are preferred. Columns should be timely, controversial, literate and technically accurate.

Contact Steve Moore, features editor, *Network World*, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701, or call (617) 879-0700, ext. 732.

Opinions

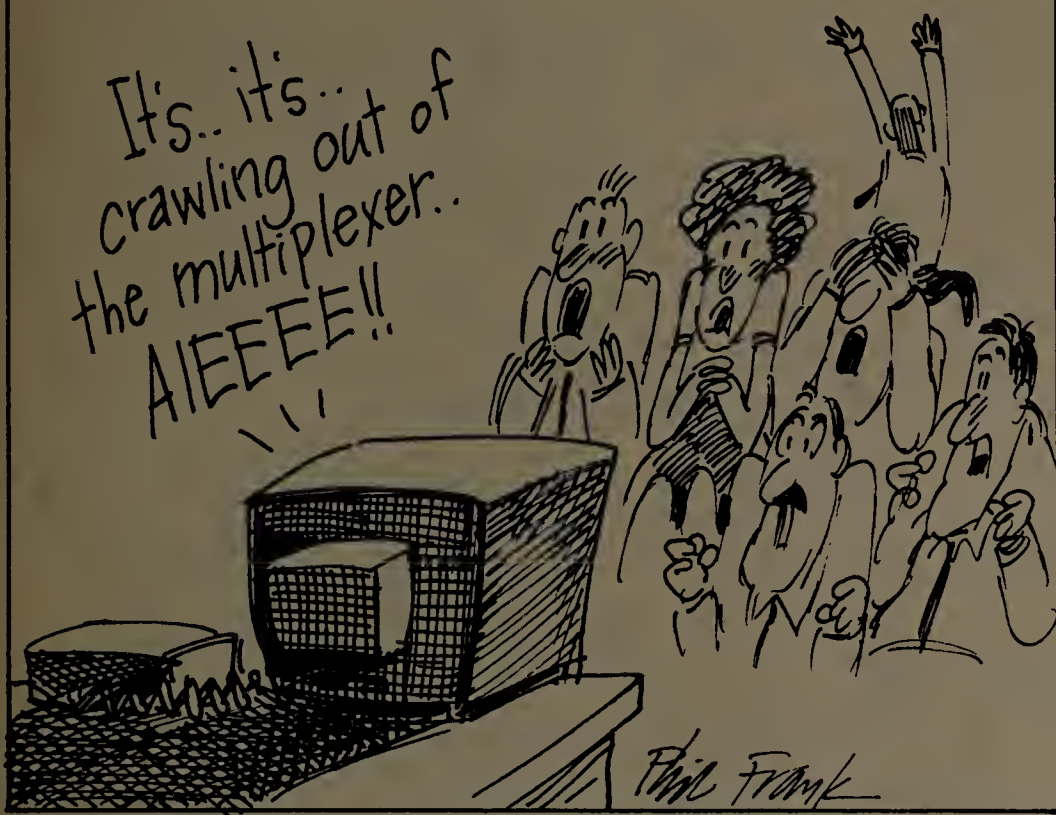
► **TELETOONS** — By Phil Frank

Great Moments in Telecommunications

#99

October 15, 1981

Stephen King writes his first telecommunications training video



Although it takes time and resources to prepare a network plan, such a plan will ensure that you know what you are buying and how you are going to manage the new technology.

Often, outside consultants can be of great benefit. Their "inside" contacts, vendor resources and practical experience can guide you through the maze of equipment features and functionality. If you would like to do it yourself, buy some books or attend specific seminars that review cost/benefit assessment, system-needs analysis, local net business management, and proposal development and analysis.

Additionally, you may want to consider evaluating equipment in-house prior to making a buying commitment. There are several indirect costs associated with such a "temporary" installation.

Time and manpower are the critical factors here: physical time to set up, configure and install; loss of employee productivity while training and becoming familiar with the new system; and lost time spent converting information to and from the temporary system. All are factors to consider.

The best advice is to approach a local network purchase or expansion armed with a plan. Allocate the necessary time to think through the process. Try to evaluate every factor that can influence the system's impact and cost-effectiveness.

Regardless of how small the system may be, you should at least run through a condensed version of a network plan. It is critical to prepare your company for anticipated changes and to develop procedures for maintaining the equipment once it is in place. This type of preplanning will allow you to be in control of the local net installation through the procurement, implementation and management phases.

Once a thorough impact/benefit statement is completed and the current system is evaluated, alternative systems are investigated and all factors are documented, you are well on your way to having a smooth, successful local-area net installation.

Anything less than thorough planning breeds unwelcome surprises and unfavorable circumstances that could easily be avoided. □

OPEN SYSTEMS INTERCONNECT

ELAINE BONHAM

The trouble with testing

When the history of Open Systems Interconnect (OSI) is written, the authors will look back at 1987 and say, "That was when the real products started to emerge."

That's because years of effort have brought the OSI seven-layer framework to a point at which the first application layer products are nearing maturity. For example, the File Transfer and Access Method protocols have become steadily more stable over the last few years, and those for X.400 (electronic mail) are ready for a test run.

The current situation with OSI is comparable to that of the automobile industry 60 years ago, when Henry Ford's Model Ts were rolling off the assembly line. Much effort had gone into developing the car, but in-house testing was relatively unsophisticated. The real test of Ford's breakthrough product came when the first customers took delivery.

As the auto industry grew, more advanced in-house testing evolved to improve the cars' quality before they reached customers. Similarly, the need for more thorough testing of OSI products has led vendors to band together in the Corporation for Open Systems (COS) to design conformance tests for OSI products.

But even the in-house tests being developed by COS aren't acid tests. With OSI, the rubber hits the road when vendors tackle the multivendor interoperability issue: the ability of different vendors' computers to work together.

Sorting out where the industry is on conformance testing is analogous to getting a driver's license in different parts of the world: Each country has its own driving test. At present, numerous groups in North America and Europe — COS, British Telecommunications plc, Deutsches Bundespost and others — are developing and conducting their own tests to check product conformance to X.400 standards.

Like the X.400 tests, driving tests measure the same basic skills, but each adds its own nuances as local conditions require.

Bonham is OSI program manager in Hewlett-Packard Co.'s Information Networks Group in Cupertino, Calif.

Thus, a license issued in one country may not be valid if the user moves to another country.

Could the industry devise a single worldwide test? Can it agree upon a uniform test suite that will ensure that an X.400 product certified in one country can be used in another without recertification?

These issues will be resolved when all countries agree to adopt the same conformance tests and recognize those of other countries. But even with conformance-tested products, there's no guarantee that different products will work together.

Conformance tests can't check for all possible errors; therefore, some minor differences between vendors' products may escape detection until these products try to exchange data. But until conformance and interoperability testing is complete, customers buying current X.400 products should remember that they're taking part in the final tests of these products. Right now, the quality of X.400 products varies with the testing that has, or hasn't, been performed.

Even more importantly, there's been limited testing of multivendor interoperability for all OSI products, and current X.400 products still raise a key issue: How completely can a vendor guarantee a product, given the immaturity of conformance and interoperability testing?

Of course, for users with the wherewithal to assume responsibility for the final stages of testing, this may not be a problem. But for users who don't have such resources, today's X.400 products may not provide the interoperability they thought they were getting.

Over the next few years, this situation will change. Major vendors now recognize the importance of conformance and interoperability tests, and much effort and money is being spent worldwide on such tests. The outcome of this work will be to move the promise of OSI — completely open systems operating globally — a big step closer to realization.

But until that day, buyers of today's OSI products should ask themselves and their vendors a question: Is what I am buying going to provide the multivendor interoperability I need? □

NETWORK WORLD

Features

July 20, 1987

The



Special Section: Centrex

return to prominence

Continued from page 1

munications. PBX manufacturers and third-party financing companies began to offer a variety of PBX leasing options.

Even before divestiture, AT&T started turning away from Centrex and concentrating on more lucrative premises equipment. In 1979, the company began a program to migrate users of older Centrex premises equipment to newer computer-based PBX systems, while still offering Centrex to other accounts. AT&T priced Centrex out of the market, making new PBX equipment look more competitive.

After divestiture, the fate of Centrex was left to the Bell operating companies, and they came to the rescue. The addition of such new capabilities as customer system administration, improved automatic route selection and station message detail recording gave Centrex what it needed to survive. As special tariffs were approved to stabilize rates for access lines, Centrex began to pick up the pace in its race with PBXs.

Since that time, Centrex has undergone numerous enhancements in terms of features, pricing and marketing strategies:

- Regional Bell holding companies are investing heavily in developing new features and aggressive pricing.
- Digital Centrex is being promoted as the gateway into Integrated Services Digital Network technology.

Serritella is the editor of CCMI/McGraw-Hill's Centrex Planning Guide and the weekly Industry News Summary for Q-TEL 1000, an on-line data base.

- Centrex is being marketed by independent sales agents as well as the BOCs.
- A new, flourishing industry has emerged, developing and selling Centrex station equipment to users.

Analog vs. digital

Centrex is fundamentally the same today as when it first appeared in the mid-1950s — a flexible and easily managed central office-based communications system. All hardware and software are located at the

rier specifications.

The emergence of digital Centrex is the BOCs' attempt to meet the competition of digital PBXs head-on. While not yet available throughout the U.S., digital Centrex service has been introduced in selected areas of the country (see Table 1 on page 32).

The service is typically based on either a fully digital central office switch — for example, AT&T's 5ESS or Northern Telecom, Inc.'s DMS-100 — or an adjunct digital switch, such as NEC Corp.'s NEAX-61E, partnered with an existing analog ESS system.

The primary feature mix for digital Centrex is mainly the same as for analog service, but it is not quite as substantial as the mix offered by digital

PBXs, which still maintain a technical edge over Centrex in overall system, station and attendant features. However, the gap is narrowing.

The new generation of digital Centrex systems offers the end-to-end digital connectivity users are demanding. The major advantages of digital Centrex include end-to-end digital switching capability and a framework designed to bolster the transition into ISDN. Communications speeds are similar to those of analog Centrex services.

Flexibility has also become a key element in the new image of Centrex. Users can order access lines from their local central offices and choose their own on-premises station equipment from a growing list of suppliers. Some RBHCs have forged agreements with independent data/voice switch manufacturers to offer integrated data and voice communications systems.

Continued on next page

After years of neglect, Centrex plugs into a growth strategy.

telephone company central office and monitored 24 hours a day to maintain the high level of performance that existed before divestiture.

Although most users continue to order systems primarily for voice, requests for proposal indicate a significant growing interest in data communications. Users want access to high-speed digital communications facilities, such as switched 56K and T-1 carrier, and they are specifying total system management as another important factor. Centrex has made great strides in these areas and is closing the gap created by digital PBXs.

Centrex data communications support, offered by analog and digital Centrex, includes: asynchronous transmission up to 19.2K bit/sec; synchronous transmission to 64K bit/sec; traffic switching without modems; access to packet-switched networks; local-area network access; and compatibility with T-1 car-

Digital Centrex offerings

Table 1

Regional Bell holding company	Name	Availability	Detariffed
Ameritech	Integrated Information Network	Illinois	✓
	Centrex DS	Michigan	
	Digital Business System	Wisconsin	
Bell Atlantic Corp.	Centrex	All states in region	Only in West Virginia
BellSouth Corp.	Digital ESSX	All states in region	
Nynex Corp.	Intellipath Digital Centrex	All New England Telephone Co.-served states	Only in Maine and Vermont
	Intellipath and Intellipath II Centrex Services	New York	
Pacific Telesis Group	Centrex	California and Nevada	
Southwestern Bell Corp.	ESSX Custom	All states in region	
US West, Inc.	Digital Centrex Centron	All states in region	All except Colorado

SOURCE: CCM/McGRAW-HILL'S CENTREX PLANNING GUIDE

From previous page

For example, Ameritech and David Systems, Inc. have successfully developed a product called the David System. Typically located on a customer's premises, these systems are linked to the telephone company's central office with standard Centrex lines.

Voice and data features are provided on the customer's site, independent of the Centrex switch. The powerful switching capabilities of Centrex are available when they are needed.

In addition to Centrex, most BOCs also offer digital PBXs through unregulated equipment subsidiaries. At first glance, this may seem to be a confusing strategy. For the BOCs, though, it makes sense: They can offer solutions to their customers, regardless of the competitive situation.

Regulatory impact

As a result of divestiture, access line charges were imposed on BOC-provided services, including residential and business lines, tie lines and Centrex. For Centrex, the monthly rate per access line neared \$6, forcing many BOCs to adjust their basic service rates to absorb these charges.

The result for customers who have signed rate stabilization agreements in the past three years is that they have no guarantee access line charges will be absorbed by the BOCs when their current Centrex contracts expire.

Many of the BOCs are attempting to shelter customers under contract from any additional federally imposed charges. New York Telephone Co., for example, has proposed a rate increase for its month-to-month Centrex customers in order to ensure that subscribers with rate stability contracts will not be subject to increases in subscriber line charges.

In fact, the company offered to slash monthly rates for its long-term customers, thus making the commitment to Centrex look more attractive.

New Jersey Bell is offering long-term customers a rate stability

contract that extends for as long as 10 years.

Centrex expansion and development has also been hindered by government regulations that prohibit BOCs from offering enhanced services, manufacturing or selling customer premises equipment and offering long-distance service outside their respective local access and transport areas.

Larger problems

While small, single-location users are not impacted by this last factor, large geographically dispersed companies must deal with various BOCs and independent telephone companies for Centrex. These large users often have to juggle different Centrex products, rate schedules and feature offerings as well as differing rate stability plans.

The frustrations of these larger users are reflected in the five-year decline through 1986 in the number of large Centrex systems sold by the BOCs. Although the total number of systems sold from 1981 through 1986 increased by 35% per year, the growth was confined to systems of 125 or fewer stations. This increase, though large, added to the total number of nationwide stations by only 2.3%.

This situation could change if the BOCs are permitted to manufacture premises equipment, to enter the lucrative interstate long-distance market and to provide enhanced information services.

Many industry sources believe that the BOCs can gain the relief they need by the end of 1987. Since the BOCs also control the "last mile" — or the part of local and interstate communications service that connects end users — their power cannot lie dormant for long. The BOCs' market potential, enhanced by their control of the last mile, makes them the most formidable competitors in the industry today.

Increased deregulation may also place Centrex in a pivotal position to gain a competitive edge in the industry. As the RBHCs and BOCs venture further into deregulation,

Centrex service — particularly digital Centrex — becomes an increasingly strategic product.

The possible deregulation or detariffing of Centrex by individual states opens up many options for the BOCs. It grants them the freedom to structure prices for specific cases and to keep rates low enough to leverage the service's position in the market.

US West, Inc. has been the most aggressive in gaining approval to cast aside the tariff-filing process for Centrex. If other RBHCs are not already seeking approval to detariff Centrex, they have begun to file case-by-case tariffs that permit them to custom-design and price Centrex systems for specific customers. In most cases, this is done for larger, more involved systems.

Features fuel future growth

In the past, Centrex users sometimes replaced their systems because they perceived Centrex as less sophisticated and more expensive than PBXs. But that trend is being reversed.

The BOCs have reduced the imbalance between Centrex and PBX features to the point where the two are nearly equal in data communications, networking and specialized functions such as voice and electronic mail. Based on sales records, PBX vendors lost a total of \$1.6 billion in sales to Centrex

systems between 1983 and 1986. This accounted for 22% of the market at the time.

Small-user Centrex

As noted earlier, the major growth market for Centrex has been the highly volatile under-125 station market, particularly for systems with 50 lines or fewer.

Special packages have been developed for this segment of the market. These packages provide the same features and availability of service as larger systems but are packaged and priced for the small user.

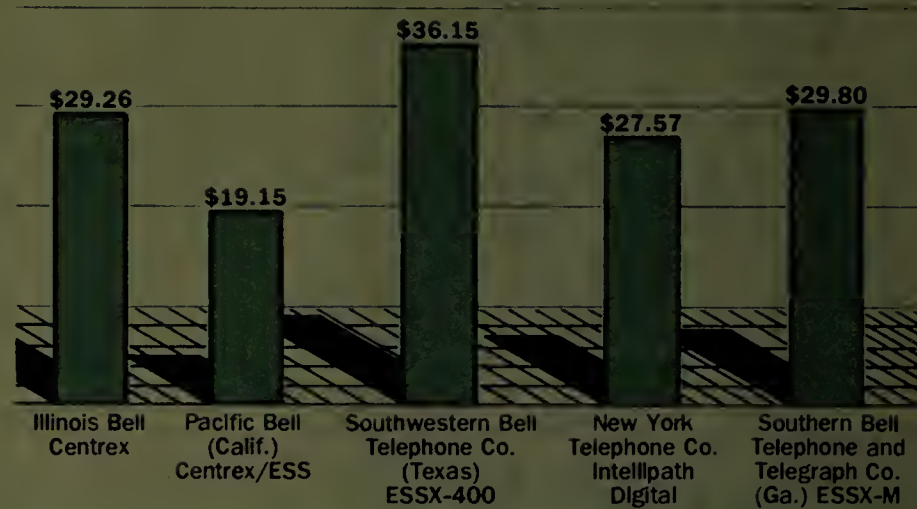
The Chesapeake and Potomac Telephone Co. offers Business Pak for companies with fewer than 40 main station lines. In the Southwestern Bell Telephone Co. region, users can opt for ESSX-30. BellSouth Corp. provides ESSX-Small, and South Central Telephone Co. offers ESSX-200 for smaller systems.

The BOCs have implemented a powerful and effective campaign designed to make Centrex a functional and reliable service for businesses of all sizes. They have emphasized its inherent flexibility, powerful features and support for strategic products and technology such as ISDN.

The revival of Centrex positions the service not only as a strategic product for the BOCs but also as a viable alternative for users. □

Monthly cost per line for Centrex service

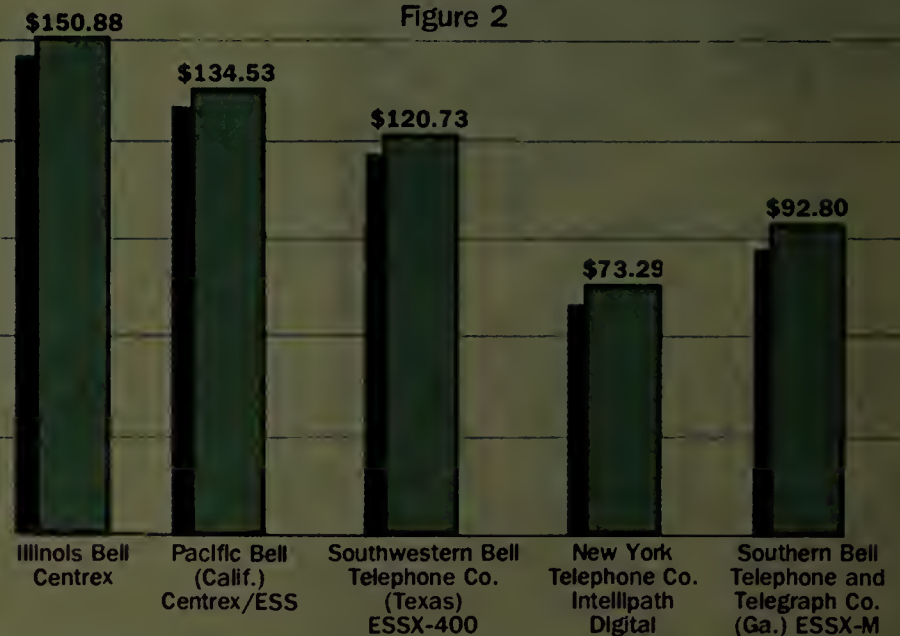
Figure 1



SOURCE: CCM/McGRAW-HILL'S CENTREX PLANNING GUIDE

Installation cost per line for Centrex service

Figure 2



NOTE: Using a standard configuration of 400 station lines, trunk terminating charges and selected additional features, Figures 1 and 2 compare prices for Centrex service for five Bell operating companies. Station equipment, assumed to have been purchased from other vendors, will be the same rate for all choices. The configuration is representative of most medium-sized installations.

SOURCE: CCM/McGRAW-HILL'S CENTREX PLANNING GUIDE

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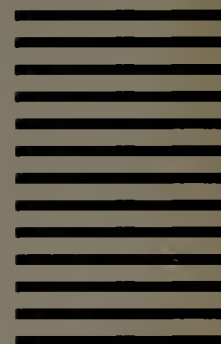
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Special Section: Centrex

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An improving mix of services is making Centrex a shining star in the telecom universe.

T

BY MIKE CANOVA
AND
ROBERT REINHOLD
Special to Network World

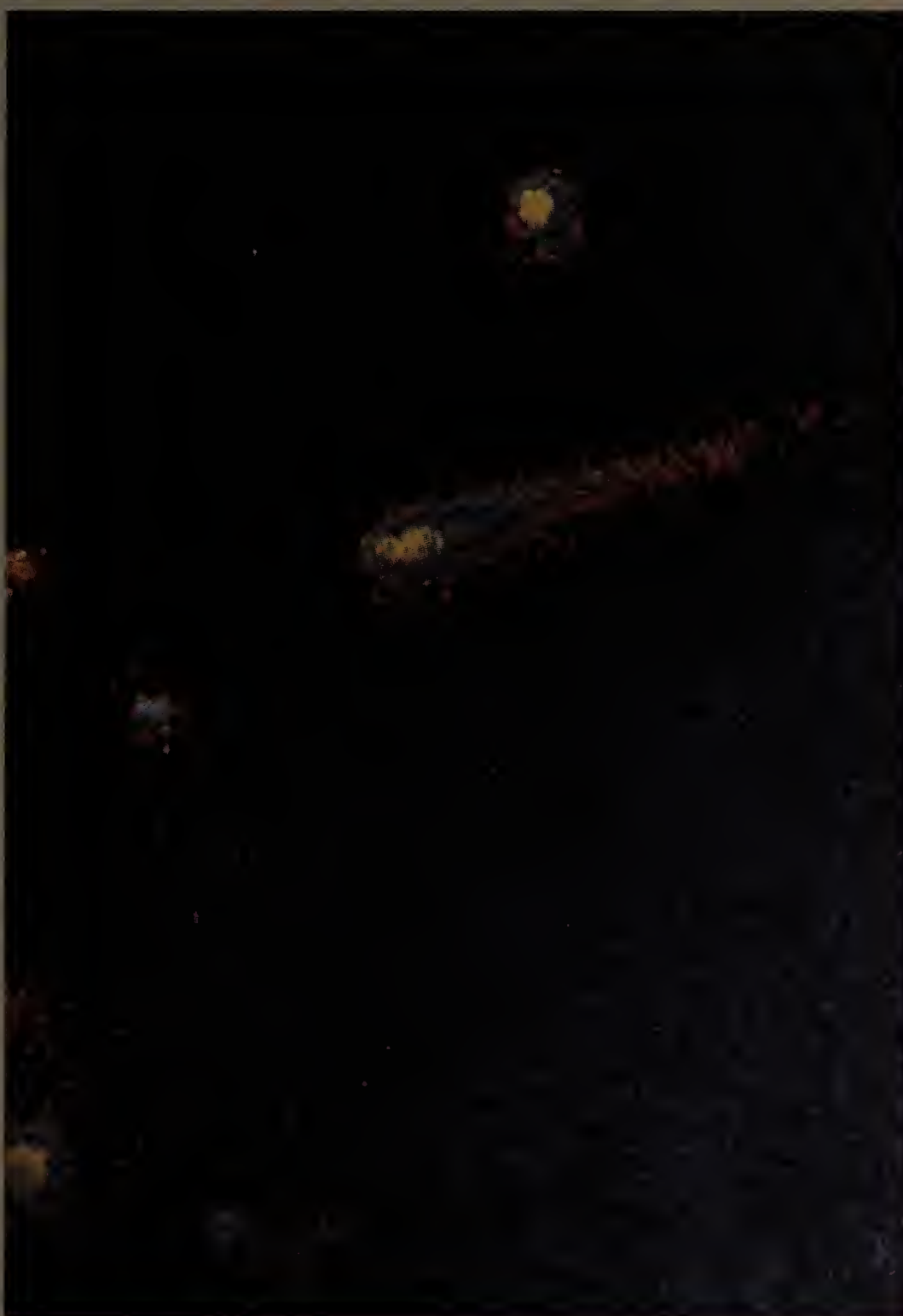
here is little doubt that Centrex is undergoing a revival in popularity. More and more businesses, especially smaller companies, are choosing to use Centrex services rather than install and maintain private branch exchange systems. The Bell operating companies are moving aggressively to improve their hardware, while simultaneously repackaging Centrex and promoting the inherent advantages that Centrex has in some applications. They've also added features to compete against PBXs.

What are the characteristics of Centrex, and what makes it seem advantageous to such a variety of potential users?

In a pure Centrex operation, each user is served by a direct line from the local central office. Switching between individual lines takes place in the central office, and the capabilities of any particular system are dependent on the switching equipment resident there.

Local central office switching equipment can be partitioned to provide each customer with the appearance of a private, dedicated switch. In reality, the local operating company merely groups the Centrex lines into customer groups. Each line within a customer group is provided with a collection of "basic" features and several optional enhanced features, depending on user needs and budget. The features provided as part of the basic service vary widely from state to state.

Canova and Reinhold are consultants with the Local Communications Group of Network Strategies, Inc., a communications consulting firm in Fairfax, Va.



A recent trend is to incorporate a collection of higher level functions, such as call transfer and conferencing, into the basic package. The Centrex of old charged a flat rate per feature per line for enhanced functions.

Centrex is generally available only in central offices with ESS switching equipment, including AT&T's # 1, 1A, 5E Generic 2 ESS and Northern Telecom, Inc.'s DMS-100. If your local central office

Continued on next page

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doesn't have one of these, your telephone company may be able to run Centrex service from a nearby central office for an additional monthly fee.

After the AT&T divestiture, the BOCs had a lot to gain by retaining their large installed base of business customers. In a variety of ways, they have all made a strong push to modernize, digitize and ad-

ly careful because their money is at risk, with only a marginal recovery potential should the lessee's business fail.

Centrex, however, is controlled by the telephone company from the central office. If a customer doesn't pay its bill, phone companies don't have to start collection processes — they can just cut the delinquent firm off. Because they have little to risk, Centrex suppli-

Centrex is not a panacea. There are situations where the service possesses inherent advantages and others for which it is not particularly well-suited.

vertise their Centrex offerings to make them competitive with PBXs. With a new marketing force behind it, Centrex has been revived to be a strong competitor.

But Centrex is not a panacea. There are situations where the service possesses inherent advantages and others for which it is not particularly well-suited.

Company stability

Consider the case of a small consulting firm vying for a government contract. Often, such companies need to increase staff by 50% just to prepare a proposal. Upon winning the contract, a staff may increase by 300% for the term of the contract; losing the contract might result in a 50% decrease in staff.

Centrex shines in an unstable environment such as this. Centrex is available for small organizations in sizes from six lines and up, with virtually no upper limit.

Gone are the days of termination liability. Lines can be added and disconnected at will. Of course, there is a cost associated with adding lines.

Unstable user environments are poorly suited to a PBX solution. With a PBX, you would have to buy additional line cards, trunk cards, common equipment and perhaps additional cabinets to support new staff. The switch room might need to be expanded, additional power and environmental systems installed, traffic studies performed and additional trunks ordered. All of this time and planning that is required with a PBX is unnecessary with Centrex.

Safe investment

In addition to reducing physical logistics, Centrex can offer a financial advantage. Companies are typically loath to gamble on an investment in PBX hardware that may not be needed until tomorrow. Small firms preparing for expansion are often short on cash. Conventional leasing is one possible solution, but only for companies with a solid credit history. Leasing companies require that the lessee undergo a thorough credit check. These companies must be extreme-

ly careful because their money is at risk, with only a marginal recovery potential should the lessee's business fail.

Centrex can provide communications to multiple locations by using existing telephone company facilities. The pricing structure varies from state to state, but in most cases, Centrex is significantly less expensive than multiple PBXs with tie lines and off-premises extensions.

Centrex shines in an unstable environment. Centrex is available for small organizations in sizes from six lines and up, with virtually no upper limit.

For example, in Washington, D.C., Centrex lines at a customer's secondary locations around the city are billed at the same rate as lines at the main location. In the case of a customer that has a main office and branches all around the city, such as a bank, all locations can be served by a single Centrex system for the same cost as would be incurred if all lines were connected to a single building.

In some states, there is a mileage charge if the secondary locations are outside the main location's serving wire center. Customers need to check the tariffs for the specific charges that apply to their organizations' needs.

Traffic

Some years ago, a clever PBX salesman pointed out to his customers that some PBXs had internal blocking and convinced them that nonblocking systems were the only way to go. Now many users will settle for nothing less than a system that is 100% nonblocking. Then, the user will install a 100% nonblocking system with only 10% central office trunking.

For most applications, that's all that is required. But if a user really needs a system that's nonblocking, he should consider Centrex. Each Centrex line goes back to the

central office like a trunk. Although Centrex is not 100% nonblocking, the probability that blockage will occur is as remote as the odds that the central office will be blocked. High-traffic applications such as telemarketing, customer service and reservation services are well-suited for Centrex.

Reliability

Because Centrex equipment is located in the central office — and in many cases is part of the same equipment — it's as reliable as central office equipment. Telephone companies quote reliability figures of less than two hours downtime every 40 years.

The central office is staffed and maintained 24 hours a day and is equipped with long-term battery backup and generators. The environment is well-maintained. After all, the building exists solely to house telephone equipment.

If there's a weak link with Centrex, it's the outside cable plant. Because each line requires its own pair, in most cases, the outside plant becomes critical. Consider the case of a 1,000-line Centrex served by a 2,000-pair cable. If the cable suffers damage on 1,000 pairs, chances are good that 500 users would completely lose service.

On the other hand, if a company had a 1,000-line PBX with 100 central office trunks on that same 2,000-pair cable, the odds are that it would lose only 50 of its trunks. Everyone's level of service would be degraded by the reduced trunking, but no one would completely lose service.

One of the fallacies heard concerning Centrex is that it doesn't

tures of modern PBXs.

Electronic and digital instruments providing feature access and key system emulation are available. Some telephone companies even offer Centrex with remote programming, so customers can make program changes themselves from terminals located on their own sites.

Centrex typically comes with a few basic features such as intercom dialing, direct inward dialing, direct outward dialing, inward transfer and hold.

In order to get enhanced features, users must pay extra for each individual feature on each individual line, every month. Typically, enhanced features include call forward, busy/don't answer, call pickup, call hold, call waiting and speed calling. Many telephone companies have recently announced packages that combine some or all of these features.

Custom Centrex

If the reader's particular application appears well-suited to Centrex for some of the reasons detailed in this article, but he requires an unavailable feature, all is not lost.

Check the tariff. If the feature is not there but seems reasonable, the user can arrange to have it installed as a "special assembly." It may be worthwhile.

Centrex Uniform Call Distributors with recorded announcers, multiple gates, make-busy circuits and call pressure indicators can all be had for the asking, if the user is persistent.

The new Centrex offerings provide a voice communications facility that's ideally suited to certain user situations. These situations are characterized by a geographically dispersed user community that is of unstable size and location. The ubiquity of telephone twisted pair and the flexibility offered by a centralized switching facility relieve many of the burdens of network reconfiguration and internode access that would be associated with a PBX-based solution.

Additionally, modernization of central offices around the country

Because Centrex equipment is located in the central office — and in many cases is part of the same equipment — it's as reliable as central office equipment.

provide all the features of a modern PBX. In the past, the number of Centrex features available was indeed limited, compared with features available on most PBXs. However, the recent trend toward modernizing central office switching equipment to digital systems is reversing this situation. Equipment such as the Northern Telecom DMS-100 and the AT&T #5 ESS in central offices can provide the fea-

is enabling Centrex service providers to offer enhanced functionality that matches much of what a PBX can offer, including data switching, if users are appropriately located.

So whether it's a mere repackaging, a new product, a new awareness on the part of users or a combination of all three, Centrex is looking like a strong product that's here to stay. ▣

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Open Systems: How open are they?

Open is as open does

The information age is upon us, but many corporations still haven't managed to exploit their information resources fully by uniting all their computers in networks.

Linking similar machines in discrete networks is tough enough; interconnecting multiple networks that contain diverse machines and transmission media is downright intimidating. How, then, can companies expect to gain efficiency and strategic advantages by integrating their networks with those of their business partners, suppliers and customers?

The answers lie in open systems and international communications standards. But hold on —

just what constitutes an "open" system?

In a special 11-part series of in-depth articles, Network World will answer that question through a vendor-by-vendor analysis of major computer makers' commitments to open systems.

This introductory article explores users' connectivity problems and the key standards intended to solve them. In the weeks to come, nine articles will assess the open systems strategies of the vendors whose logos appear above. A concluding article will wrap it all up and show just who communicates best with whom in the mumbo-jumbo world of open systems networking.

BY MICHAEL FAHEY
Senior Writer

When it comes to computer gear, Burlington Northern Motor Carriers, Inc. is a straight IBM shop. Telecommunications Manager Clint Cooper says the Fort Worth, Texas-based trucking company minimizes hardware incompatibility problems by using only Big Blue equipment.

But Cooper isn't entirely pleased by this strategy, because he views many of IBM's networking solutions as "clunky." In addition, he says, Burlington Northern wants to use a new system to support communications between its office

Continued on next page

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computers and remote, truck-based terminals — but that system is not IBM-compatible.

Many organizations prefer to avoid dependence on a single vendor by using a variety of computer hardware. This approach, in theory at least, allows users to employ whatever vendor's equipment is most appropriate for a given application. Unfortunately, this multi-vendor tactic often leads to much worse compatibility problems than Burlington Northern experiences as a result of its single-vendor computer strategy.

"The great progress we've achieved with advances in technology has caused new problems because of the lack of connectivity,"

says Bill Brindley, director of computer technology for the U.S. Naval Services Group in Washington, D.C.

The first formal response to users' need for standards to support multivendor connectivity came in March 1977, when the International

Standards Organization (ISO) took on the arduous task of building user and vendor consensus on its proposed Open Systems Interconnect (OSI) architecture and protocols.

As its name implies, OSI provides a means to "open" vendor-

specific closed systems by linking them to each other via a common intermediate communications architecture. Kathleen Dally of Omnicom, Inc., a Vienna, Va., consulting company that addresses communications standards, likens OSI to a universal language that would allow all the people of the world to communicate. Rather than learning every language spoken in the world, people could learn one international language.

Similarly, OSI's standard, layered stack of protocols can be implemented in parallel with any hardware vendor's proprietary protocol stack. "OSI provides emancipation from vendor dependence," Dally observes.

OSI provides architectural flexibility through multiple protocol options at each of its seven layers. Application-specific subsets of OSI can be built by selecting a specific protocol option at each layer.

General Motors Corp. took that approach in its OSI-based Manufacturing Automation Protocol architecture for factory floor applications. Similarly, Boeing Corp.

OSI provides a means to "open" vendor-specific closed systems by linking them to each other via a common intermediate communications architecture.

Unfortunately, the OSI architecture doesn't provide standard protocols for all functions necessary in multivendor networks.

developed the Technical and Office Protocol architecture for technical office applications. Both companies seek to have their "slice of OSI" architectures accepted as standard within their own industries.

OSI limitations

OSI is by no means the only open systems standard. The Consultative Committee on International Telephony and Telegraphy, the American National Standards Institute and other standards organizations also develop standards; but luckily for users, they coordinate their activities closely with one another and with ISO. For example, there are corresponding ISO standards for many CCITT-developed standards, including the X.400 electronic messaging protocols, which allow any user-defined message to be placed in a standard electronic "envelope" and delivered to any electronic mail destination.

Unfortunately, the OSI architecture doesn't provide standard protocols for all functions necessary in multivendor networks. It doesn't address network manage-



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ment, so ISO is developing separate network management standards expected to be completed by 1988. And OSI doesn't address specific user applications at Layer 7, so additional application-specific standards are needed to link different vendors' spreadsheets, word processors and other applications.

"Standardization is a bit like what's happened in modern phys-

such mockeries of the open systems concept, the Corporation for Open Systems (COS), a consortium of users and vendors, has taken on the task of monitoring and testing OSI protocol standards and driving the development of OSI products.

But while the formation of COS is a hopeful sign on the road to connectivity, the problems that confront the organization cast

OSI doesn't address specific user applications at Layer 7, so additional application-specific standards are needed to link different vendors' spreadsheets, word processors and other applications.

ics over the last couple of decades," says James Herman, principal consultant of the Telecommunications Consulting Group at BBN Communications Corp. in Cambridge, Mass. "First they find molecules, then atoms, and finally protons, electrons and neutrons. Then they find quarks, and everybody is wondering whether they're going to find something else after that.

"We standardized on X.25, and then everybody realized there are seven layers we have to standardize on," Herman continues. "When you get done with all those layers, you find out there are many things that have to be standardized that have nothing to do with communications protocols but are concerned with the meaning of the information we're exchanging with each other.

"The X12 [electronic data interchange] standard is a perfect example," he says. "It's an attempt to define higher level constructs for invoices and, within them, ways of specifying part numbers and other information."

ANSI's X12 EDI protocol illustrates the standards-within-standards situation that will confront users in the future. EDI application messages that conform to X12 will be carried by E-mail systems based on X.400, which will, in turn, be accommodated within Layers 6 and 7 of an OSI-based communications architecture implemented in a gateway between, for example, IBM and Digital Equipment Corp. proprietary network architectures.

X.400 and the CCITT X.25 packet-switching protocols, which are also accommodated within OSI, illustrate a more serious problem for users. Instead of cooperating closely to ensure all their implementations of these protocols are virtually identical, different vendors implement these standards in different ways. Users that buy so-called "standard" products from different vendors often find them to be incompatible and are forced to waste time and money modifying them to work together as they were supposed to in the first place.

With an eye toward preventing

light on some of the inherent difficulties in achieving multivendor connectivity.

Dominated by vendors, COS has just 17 user companies among its 65 members. Moreover, user organizations such as the International Communications Association (ICA) and the Tele-Communications As-

While the formation of COS is a hopeful sign, the problems that confront the organization cast light on some of the inherent difficulties in achieving multivendor connectivity.

sociation are not eligible for full membership in COS and are relegated to an advisory role.

The large part played by vendors in COS has raised user concerns that computer makers will exploit the organization by promoting their proprietary protocols, thus leaving users again holding a bag of incompatible products.

"It is extremely difficult in a large organization to have all systems playing together because the major equipment vendors are constantly touting their own proprietary protocols," says David Edison, director of corporate information and communications systems for Westinghouse Electric Corp. in Pittsburgh.

It's a classic catch-22 situation. "Everybody says they have X.400 capability," Edison says, "but try to buy a working X.400 interface. Everybody's sales department but IBM's says they have one. But they don't have one that doesn't have a ton of restrictions. The problem is that you don't get the full function or you need an interface box that is outrageously expensive." For example, Edison says, a vendor may have an X.400 product that includes message-transfer agent capability but has no directory function, or the opposite might be true.

Edison echoes the sentiments of many users when he says, "We're fed up with this approach. We're looking for performance from our systems, and in order to get better performance, we need the pieces playing together."

The computer industry pacesetter, IBM, has what Edison describes as "an even more tantalizing approach." At this year's ICA conference, according to Edison, a top IBM official told ICA members that IBM had announced X.400 in Europe but currently had no plans to bring it to the U.S.

Chuck Gardner, chairman of the U.S. MAP/TOP Users Committee and coordinator of control systems and computer technology at Eastman Kodak Co. in Rochester, N.Y., faces a similar dilemma: "Ultimately, we want the computers and networks at our company to be able to communicate with government agencies, suppliers and retailers.

"Multivendor connectivity is very important," he says. "For example, on the factory floor, we have all kinds of different devices using different protocols. We tell IBM that SNA is great, but it doesn't communicate with our ASEA [Robotics, Inc.] robots. It also doesn't work with my Allen-Bradley [Co.] controller.

"The same problem exists in the office," Gardner says. "My Wang system doesn't communicate with Apple computers or with IBM's PROFS system. The proprietary solutions are cut out for specific markets. We're looking for much broader-based solutions."

Because fully functional OSI-

thing as OSI," Herman says. "It doesn't have the international backing OSI has, but it's rooted in the same fundamental principle of providing generic communications functions that are not tied to any specific kind of device or configuration and that can be tied to lots of different networking technologies."

At what point should users implement OSI, rather than either TCP/IP or a jumble of proprietary gateways, to link a mix of vendor-specific architectures such as IBM's SNA, DEC's Digital Network Architecture and Data General Corp.'s Xodiac?

According to Herman, TCP/IP is the best bet for users that have a variety of equipment in place already and need to tie it together right now. Users that are just now entering into new long-term network projects or that don't need sophisticated multivendor connectivity for their existing systems right away are better off waiting for about two years and then launching a full-scale OSI effort.

When fully functional OSI products finally become available, users that have implemented TCP/IP will probably end up migrating to OSI. "Migrations are always difficult," Herman notes. "You have to migrate in a full suite. You don't do it layer by layer."

Why have computer vendors been so slow in conforming to international standards that users still need interim solutions?

"I think that, in the dark caverns where the vendors determine policy, someone decided that interconnectivity would not be of commercial advantage," Edison observes. In addition, he says, vendors may be more concerned with developing fixes to existing problems in their products than with meeting international standards.

One of the most effective ways for users to influence vendors to support open systems standards is to make adherence to such standards mandatory for all system purchases. As more users vote for open systems through their procurement policies, more vendors

At what point should users implement OSI, rather than either TCP/IP or a jumble of proprietary gateways, to link a mix of vendor-specific architectures such as IBM's SNA and DEC's DNA?

compatible products aren't available yet, many users are looking for interim alternatives. According to Herman, the best vendor-independent communications architecture that's available now is the Transmission Control Protocol/Internet Protocol protocol suite developed by the U.S. Department of Defense.

"TCP/IP is exactly the same

will realize that providing connectivity to competitors' systems will increase, not decrease, their sales.

In our Aug. 3 issue, this series will continue with Network World Senior Editor Pam Powers' examination of Wang Laboratories, Inc.'s efforts to promote connectivity and to adhere to international standards. □

AT&T cuts SDN rates

continued from page 1

can serve as a customer's primary network or as an extension to a private corporate network.

The new switched access arrangement enables customers with less than 200 hours of monthly traffic to use basic, dial-up local access facilities to access SDN.

Formerly, switched access could be used only on one end of an SDN call; the other end had to be supported by a dedicated or special access link. More often than not, however, customers used dedicated local links to tie all locations into SDN.

Using switched access at both ends of an SDN call is less expensive than dedicated local access for customers with low traffic volume applications. Higher traffic volume applications will justify the use of special access facilities.

Switched access can also be used in conjunction with a new dialing option that enables a customer location that uses a carrier other than AT&T to access SDN by dialing a five-digit equal access carrier identification code (10XXX).

The code allows the subscriber to route SDN calls over switched local facilities rather than dedicated local loops, as was previously required.

A customer of MCI basic long-distance service, for example, might still want to access the AT&T SDN network of a parent or affiliated company, a capability now made possible with the 10XXX arrangement.

Customers will be able to pre-subscribe to SDN switched access or use it on a call-by-call basis by dialing the 10XXX code. Switched access users will pay a \$200 installation fee and an \$85 monthly

charge for each group of access lines served.

The 10XXX option and switched access "is being provided in response to customer demand and market competition," said SDN Marketing Manager Glenn Starr. "We had a number of SDN customers who wanted an economical way to put their low-volume locations on SDN. In order to keep those customers from going over to Sprint or MCI, we decided to offer switched access."

Robert Ellis, president of The Aries Group, Inc. in Rockville, Md.,

The 10XXX option and switched access "is being provided in response to customer demand and market competition," said SDN Marketing Manager Glenn Starr. "We had a number of customers who wanted an economical way to put their low-volume locations on SDN. In order to keep those customers from going over to Sprint or MCI, we offered switched access."

said switched access is designed more to satisfy existing SDN customers than to attract new users. "Switched access will allow existing customers to make better use of their SDNs."

Typical SDN customers use the service to complement their private corporate networks, according to Ellis. Typically, the private network carries 90% of their traffic, and 10% is carried on the SDN, he explained. "There are a number of remote, low-traffic locations that are not on the private network. SDN switched access gives

that customer an economical way to tie those locations into the corporate network via SDN."

The rate changes were apparently inspired by competition. SDN rates were cut 6.3% for calls that originate over switched access facilities and terminate over dedicated facilities, and 8.1% for calls that originate and terminate over dedicated local links.

"The new rates reflect the actual cost of providing SDN, whereas the original rates were based on estimates that were a bit higher than actual cost," Starr said. The cuts will bring AT&T's rates in line with MCI's and Sprint's, which have been about 10% below AT&T's, Self said.

Some large AT&T customers have looked elsewhere for virtual network services due to price differences. Bechtel Corp. recently signed a contract for MCI virtual private network service because "MCI came through with the best price," according to Information Services Manager Ray Pardo. "If the AT&T rate cuts came sooner, we might have gone with AT&T. Price is still the most important consideration."

Analyst Joaquin Gonzalez, vice-president at Gartner Group in Stamford, Conn., said the rate changes "have more to do with internal competition at AT&T than with competition from other carriers. The competition is between SDN and high-capacity private lines. AT&T is more worried about customers demanding high-capacity digital transport than they are with customers fleeing to MCI."

According to AT&T, SDN revenue will increase \$32.9 million above original revenue estimates of \$67 million as a result of these changes. SDN demand will increase to 46 million messages and 184 million minutes of use in 1987. □

CALENDAR

July 26-30, Minneapolis — ACUTA 16th Annual Conference. Contact: Association of College & University Telecommunications Administrators, 211 Nebraska Hall, Lincoln, Neb. 68588.

July 27-28, Toronto — Understanding Data Communications — A Practical Guide. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015.

July 27-28, Chicago — Understanding IBM Systems, Products and SNA. Contact: TeleStrategies, Inc., 1355 Beverly Road, McLean, Va. 22101.

July 27-29, Boston — Fiber Optic Communications. Contact: *Business Communications Review*, 950 York Road, Hinsdale, Ill. 60521.

July 27-31, Anaheim, Calif. — SIGGRAPH '87. Contact: The Special Interest Group on Computer Graphics, Suite 600, 111 E. Wacker Drive, Chicago, Ill. 60601.

July 28-29, Toronto — Corporate Connectivity and Micro-Mainframe Links. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

July 30-31, New York — Networking Personal Computers. Contact: School of Continuing Education, New York University, 575 Madison Ave., New York, N.Y. 10022.

Aug. 3-6, Cupertino, Calif. — Advanced Computing Environments at Techmart Tutorial Sessions. Contact: Advanced Computing Environments, 21370 Vai Ave., Cupertino, Calif. 95014.

Aug. 4-7, Colorado Springs — Symposium on the Simulation of Computer Networks. Contact: Computer Science Department, University of Colorado at Colorado Springs, Colorado Springs, Colo. 80933.

Aug. 5, Arlington, Va. — Open Network Architecture. Also, Sept. 9. Contact: TeleStrategies, Inc., Suite 100, 1355 Beverly Road, McLean, Va. 22101.

Aug. 5-7, Boston — Network Wiring Techniques. Contact: Data-comm Group, 55 Main St., Madison, N.J. 07940.

Aug. 6, Sunnyvale, Calif. — Local Area Networks. Contact: Registrar/Data Communications and Network Training, AT&T, P.O. Box 45038, Jacksonville, Fla. 32232.

Aug. 6-7, Ft. Lauderdale, Fla. — An Intensive Introduction to T-1 Networking. Also Aug. 10-11, Chicago; Aug. 12-13, Detroit; Aug. 20-21, Cincinnati. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015.

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Purolator changes path

continued from page 1

Purolator's Ku-band very small aperture terminal network will support two-way communications between Purolator's data center, housed at the company's headquarters here, and 60 Purolator sites in the Eastern and Midwestern U.S. The value of the Cylix contract was not disclosed.

Purolator has some experience with Cylix's C-band VSAT network service. In 1982, the company began using the Cylix service to link some of its sites with lower volume data traffic to the data center.

Purolator Director of Telecommunications Barry Van Zile said the company is casting off its leased-line network to cut costs. "We should save in the range of \$50,000 to \$60,000 a month," he said. Van Zile declined to divulge Purolator's network expenses.

Van Zile added that the company expects an increase in reliability with the Cylix VSAT network. "Cylix offers 24-hour-a-day, seven-day service. You can call up their help desk and you're going to talk to a person, which is a warm

feeling. We're very happy with the reliability and service we've had with Cylix thus far," he said.

Van Zile said he is confident the VSAT network will meet Purolator's response time requirement of two to three seconds.

The star-shaped leased-line network Purolator has slated for oblivion is based on virtual circuit-switched multiplexers purchased from Doelz Networks, Inc. Van Zile would not divulge the cost of the equipment or what the company intends to do with it once the VSAT net is operational.

Each of four regional centers on the network is equipped with Doelz's large, controller-type data concentrator, the Esprit One. The Esprits are tied to a fifth Esprit at Purolator's data center, which has an IBM 3090 mainframe and serves as the network hub. The Esprits are linked via 56K bit/sec AT&T Dataphone Digital Service (DDS) lines.

In addition to feeding traffic to the 3090, the data center Esprit routes traffic between regional centers and acts as a controller for several other remote sites. The four regional centers support five to 10 smaller sites with leased lines

operating at 9.6K bit/sec. The four regional centers are in Columbus, Ohio; Elmhurst, Ill.; Irving, Texas; and Atlanta. Backup DDS circuits run between the Columbus and Elmhurst sites, and between the Atlanta and Irving sites.

Each of the remote sites, 56 in total, uses a smaller Doelz concentrator device, the Elite. All sites use Telex Computer Products, Inc. 274 terminal controllers, an IBM 3274-compatible device, to support Telex 3270-type terminals at the site. Approximately 1,200 terminals are spread among the 56 regional sites and four controller sites.

Van Zile has no complaint about the level of support Doelz provides for the network. "We had the service we needed," he said. But the network's overall costs were higher than originally anticipated. Purolator needed too many of the leased lines, both the 56K and 9.6K, and the lines stretched too far across the U.S. to be cost-effective. "The Doelz network was very expensive for Purolator to run," he said.

Under the terms of the contract, Cylix will cut over the 60-site VSAT network in stages. In the

first stage, individual Purolator sites will transmit data via 9.6K bit/sec leased lines to one of Cylix's 35 so-called remote data concentrators. Most of the 35 remote data concentrators are equipped with C-band VSAT dishes. That Cylix gear will bounce the data off a satellite to Cylix's Memphis headquarters, from which traffic will be sent to Purolator headquarters via leased lines.

Cylix's Memphis center is already linked to the Purolator data center via two 56K bit/sec DDS circuits and will soon be linked with an additional pair.

Cylix will also provide a backup satellite link between Memphis and the data center, according to Van Zile.

Then Cylix will begin installing 1.8-meter Ku-band VSAT dishes at each of the 60 Purolator sites and will equip Purolator's headquarters with a master earth station. Traffic will be transmitted via satellite from the remote sites to the master station, bypassing Cylix's headquarters, where a backup master station will be maintained.

Van Zile said Purolator runs about 10 applications, all customized and CICS-based. □

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US Sprint users back new guard

continued from page 1

US Sprint is moving to solve internal problems and say they intend to remain with the carrier.

During a news conference in Washington, D.C. last week, newly appointed President Snedaker detailed his plan to resolve billing problems. Some \$76 million dollars of the \$350 million write-down were attributed to what the company labeled "uncollectible accounts receivable."

Snedaker said billing errors "hurt our reputation with customers" and that correcting the situation will be his first priority. Observers said that, during the height of the billing problems, customers were erroneously billed for paid-up accounts, were billed six to nine months late and were undercharged for service.

"We ran into MIS problems because of our growth rate and because of the problems with trying to merge GTE Sprint and United

Telecommunications operations," Snedaker said. "The task of merging the two was a lot more complicated than we expected."

When asked why Skibo could not correct the billing problems, United Telecommunications Co. President William Esray said, "I don't see what purpose that question serves. We [the board] met with Charles, discussed the problem, and he resigned. Charles identified the billing problems, and we expect Bob to continue efforts to correct them."

Some users said they had experienced annoying problems with billing, but that most were not serious. "We've had some small problems with billing but virtually none with the rest of US Sprint's service," said one user, who asked to remain anonymous.

But US Sprint's billing problems are symptomatic of a larger problem of cost control the company is now moving to correct, analysts said. The company is waging an expensive battle to wrest the No. 2 slot in the long-distance market

from MCI Communications Corp. It is struggling to build its fiber-optic network while shelling out millions of dollars for facilities leased from other carriers, primarily AT&T. US Sprint has completed about three-quarters of its planned 23,000-mile fiber net at a cost of some \$3 billion over the last three years.

Despite revenue growth, the carrier's pretax losses mounted from \$158 million in the third quarter of 1986 to nearly a quarter billion dollars in the first quarter of 1987.

US Sprint is hopeful that Snedaker can help the company get a handle on spiraling costs. "Snedaker's the right man for that job," said Frank Governali, assistant vice-president for New York-based Kidder, Peabody & Co., Inc. "US Sprint has suffered from a lack of proper administrative control, and Snedaker has the management skills to turn that around."

Snedaker has 38 years of experience in telecommunications management with the Bell System and at United Telecommunications, where he was vice-chairman and chief operating officer before taking over at US Sprint. Analysts describe him as a strong manager.

Former US Sprint President Skibo is generally credited with placing the carrier on the fast-growth track, particularly in the business arena, where the "vast majority of its revenue is generated," said Geoff Johnson, telecommunications analyst with Argus Research Corp. in New York.

"Skibo was a great marketing individual, but his skills generated more business than the organization could handle," said Stephen Saks, director of MIS for the California Trucking Association in W. Sacramento, Calif. Saks uses a number of US Sprint's services and said he intends to sign up for other

services in the near future. Snedaker's appointment is "an excellent move," he said. "He's an operations-oriented individual."

Two other users, who asked to remain anonymous, agreed that Snedaker's appointment increased their confidence in US Sprint. "I'm very pleased that the operations side, rather than the customer growth side, will get the attention now," one user said. Another pointed out that his service has continued to improve with the addition of fiber to the network, and that Snedaker's operational background reassures him that the fiber project will be a top priority.

While no one has suggested that US Sprint will abandon its fiber plans to reduce expenses, it is clear that the carrier will have to make cuts somewhere in the budget as it struggles toward profitability.

Cost-cutting always brings with it the potential for layoffs, but during the press conference, Snedaker denied there would be any. "We're a growing company. We may just decide to grow our staff more slowly than our customer base. Indiscriminately laying people off is the fastest way to get a union that I know of. We wouldn't want to do that," he said.

A spokesman with United Telecommunications, one of US Sprint's parents, said the company's costs will be largely reduced with an improved billing system and with the migration to fiber. Last year, US Sprint shelled out 28% of its revenue for facilities leased from other carriers. That will decline to 10% this year, he said.

James A. Bellessa, vice-president of research with D.A. Davidson, a research firm in Great Falls, Mont., said new management will focus on those two projects, allowing US Sprint to "control its expenses while revenue continues to rise." He estimated the carrier will be in the black by mid-1988. □

AT&T revenue

continued from page 4

system for long-distance customers, an AT&T spokeswoman said. The project, which will continue through 1988, will increase the company's efficiency, she said.

The increase in long-distance revenue was tempered by a decline in product and leased equipment revenues. Product revenue declined 1.5% to \$2.5 billion. AT&T said sales of its 5ESS digital switching system increased during the quarter, while sales of personal computers, business communications equipment and transmission and light guide equipment de-

clined.

The AT&T spokeswoman said the decline in data products and communications products was a result of intense competition and AT&T's transition to a combined sales force for its entire product and service line. She said the company is still in the process of melding those separate sales forces.

Powers said, "AT&T will struggle with its computer and PBX lines for a long time."

The AT&T spokeswoman said earnings in the coming quarters will be positively affected by the changes in manufacturing and staff that have been set in motion by the cost reduction program. □

First users rate PBX system high

continued from page 2

ogy and Newport News Shipbuilding and Dry Dock Co., a subsidiary of Tenneco, Inc., said that the ability to administer all telephone station moves, adds and changes is the most valuable of CSM's features. Corporations have complained they have paid as much as \$110 per station move, add or change with other systems.

Sonny Marini, telecommunications supervisor for Newport News Shipbuilding's telecommunications and administration department, said AT&T's CSM installation team helped guide the user through a rocky early installation period.

"Early on, we had some very major problems with the system," he said. "I would type into CSM to change 50 telephone stations, and sometimes not all station change instructions were reaching the switch," he recalled. "I would have to make sure all changes came across." Marini said this problem was quickly solved by AT&T.

Marini said much of his staff's early experience with CSM was on-the-job-training as opposed to classroom instruction. "But," he

added, "our installation team helped out by performing beyond the call of duty," he added. "After the first six months, the system worked very smoothly." Marini said all moves, adds and changes of telephone stations are facilitated by use of CSM. He oversees the operation of a trio of System 85s, which serve a total of 10,000 to 12,000 lines. "If one of our ships is moved from one end of the shipyard to another, we might have to move about 500 telephone stations in 24 hours," he explained. Marini uses an optional CSM Cost Management Feature for cost allocation and billing back different departments for telephone system usage.

John Kingland, telecommunications director for Iowa State University, said two full-time telecommunications staffers continue to log 40-hour weeks inputting telephone system data into the university's VAX 11/780 superminicomputer. Kingland said CSM is a powerful management tool. "CSM allows me to administer moves, adds and changes immediately, or to schedule this work to take place at night or during a weekend when the switch is not being used," he explained. A PBX administrator can accomplish these tasks by ac-

cessing CSM with AT&T terminals.

The university's telecommunications director, who runs an 11-node, 12,000-station voice system, said the system provides voice net management and obviates the need for additional staff to operate the switch. "CSM allows me to administer a very large network with very few people." The system can also be accessed remotely from each company location via a dial-up telephone line.

Pat Paul, telecommunications director for Cornell and director of the System 85 Users Group's Eastern Region, said there were many squabbles when CSM was first implemented.

"Part of our early problems with CSM can be attributed to its being a new product; the rest were because we were not getting the training we needed," she explained. AT&T has corrected the problem by creating formal CSM training classes, she said.

Paul, who directs the operation of a voice net anchored by a System 85 serving 13,000 lines, said she is pleased with the current performance of CSM. She has, however, compiled a list of operational problems with the system that she wants AT&T to address. □

NCR boosts 5620 FEP

continued from page 2

with the introduction of the 5620.

IBM was unsuccessful in positioning its 3710 network controller to fill this market niche, according to L. David Passmore, principal at Network Strategies, Inc., a consulting firm in Fairfax, Va. In May 1986, IBM announced a scaled-down version of its 3725 front-end processor, the IBM 3720, to meet the needs of remote users. IBM customers greeted that product with open arms. Passmore said NCR Comten's desire to match the IBM 3720's ability to support 60 communications lines was a principal reason for the new model.

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The price for the Comten 5620XP ranges from \$16,000 to \$111,482, and the product will be available in the fourth quarter. Current 5620 users can purchase for \$11,000 an add-on subsystem that will enable their front-end processor to work with the additional communications lines. □



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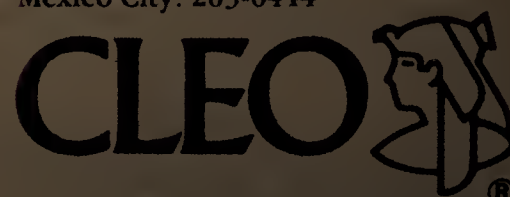
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